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# LAND USE AND TRANSPORTATION STUDY BOSTON NAVAL SHIPYARD

PREPARED FOR  
ECONOMIC DEVELOPMENT AND INDUSTRIAL COMMISSION  
CITY OF BOSTON  
BOSTON REDEVELOPMENT AUTHORITY



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PHASE II REPORT  
19 July 1974



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ECONOMIC DEVELOPMENT AND INDUSTRIAL COMMISSION  
CITY OF BOSTON  
BOSTON REDEVELOPMENT AUTHORITY

## Land Use Planning and Environmental Studies

Wallace, Floyd, Ellenzweig Inc.  
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Land Use Planning

Walden Research Division of Abcor, Inc.  
Air Quality

Cambridge Acoustical Associates  
Noise

## Economic and Marketability Studies

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Economic Feasibility, Tax and Job Impact,  
Marketability

H.B. Maynard and Company  
Industrial Management

## Transportation and Engineering Studies

Barton-Aschman Associates  
Transportation Planning, Railroads, Port,  
Civil Engineering

Carl R. Englund  
Rail and Marine

PHASE II REPORT  
19 July 1974





## ACKNOWLEDGEMENTS

Wallace, Floyd, Ellenzweig Inc. gratefully appreciates the participation and cooperation in this Study of Chris Knowles and Rick McNeil of the Economic Development and Industrial Commission and Marc Older of the Boston Redevelopment Authority. Their active involvement has insured that the work will serve the needs of the City of Boston. Our Thanks are also extended to Admiral Rumble and Captain W. E. Kaloupek of the United States Navy, who gave us their own and their Staffs' time and cooperation to help us gain an understanding of the Shipyard.



## TABLE OF CONTENTS

SECTION I	<u>Page</u> I-1	<u>INTRODUCTION</u>
SECTION II		<u>SUMMARY PHASE II</u>
	II-1	Process
	II-1	Charlestown
	II-5	Charlestown Package A
	II-9	Charlestown Package B
	II-13	Charlestown Package C
	II-15	South Boston
	II-19	South Boston Package A
	II-23	South Boston Package B
	II-24	Transportation Summary
	II-25	Assessment of Environmental Impact
	II-28	Implementation
SECTION III		<u>LAND USE AND ENVIRONMENTAL STUDIES</u>
	III-3	<u>SUMMARY PHASE I</u>
	III-3	Boston Harbor Plans
	III-4	Charlestown Physical Characteristics
	III-11	Site Zones - Charlestown
	III-13	Alternative Land Use Packages - Charlestown
	III-16	South Boston Physical Characteristics
	III-21	Site Zones, South Boston
	III-22	Alternative Land Use Packages
	III-22	Phase I Decisions
		<u>DEVELOPMENT PACKAGES</u>
	III-23	Introduction
	III-25	Assessment of Environmental Impact
	III-33	Charlestown Package A Industrial/Institutional
	III-33	Industrial
	III-36	Institutional and Retail
	III-39	Demolition
	III-40	o Special Reuse Considerations
	III-41	Site Infrastructure
	III-43	Assessment of Environmental Impact
	III-47	Costs
	III-49	Charlestown Package B Housing/Industrial/ Institutional
	III-49	Housing/Hotel/Retail
	III-52	Industrial
	III-53	Institutional
	III-55	Demolition
	III-56	Special Reuse
	III-57	Site Infrastructure
	III-59	Assessment of Environmental Impact
	III-64	Costs

<u>Page</u>	
III-65	Charlestown Package C Hotel/Convention/ Housing/Industrial
III-65	Hotel/Convention/Retail
III-67	Housing
III-68	Institutional
III-71	Demolition
III-72	Special Reuse Condiderations
III-73	Site Infrastructure
III-74	Assessment of Environmental Impact
III-79	Costs
III-81	South Boston Package A Industrial Park
III-81	Description
III-83	Demolition
III-83	Special Reuse Considerations
III-83	Site Infrastructure
III-84	Assessment of Environmental Impact
III-87	Costs
III-89	South Boston Package B Container Port/ Industrial Park
III-89	Description
III-90	Demolition
III-90	Special Reuse Considerations
III-91	Site Infrastructure
III-93	Assessment of Environmental Impact
III-96	Costs

#### SECTION IV

#### TRANSPORTATION

IV-1	<u>SUMMARY PHASE I</u>
IV-1	Existing Transportation System
IV-5	Identification of Transportation Restraints
IV-8	Transportation Advantages
IV-9	Transportation Objectives
IV-11	Process and Strategy
IV-19	<u>DEVELOPMENT PACKAGES - TRANSPORTATION CONSIDERATIONS</u>
IV-20	Charlestown External Roadway Improvements
IV-31	Package A Industrial/Institutional
IV-37	Package B Housing/Industrial/Institutional
IV-43	Package C Hotel/Convention/Housing/Institutional
	South Boston
IV-49	Package A Industrial Park
IV-53	Package B Container Port/Industrial Park
IV-57	Shipbuilding

#### SECTION V

#### ECONOMIC ANALYSIS AND MARKETABILITY

V-1	Summary of Previous Market Findings
V-3	Summary Evaluation of Development Alternatives
V-6	Implementation Issues
V-9	Charlestown Package A Industrial/Institutional



Page

V-29	Charlestown Package B	Housing/Industrial/ Institutional
V-53	Charlestown Package C	Hotel/Convention/ Housing/Institutional
V-73	South Boston Package A	Industrial Park
V-83	South Boston Package B	Container Port/ Industrial Park

APPENDIX

A-1		COSTING METHOD
	A-1	Unit Cost Determination
	A-4	Unit Costs
A-2		AIR
	A-7	Applicable Air Quality Regulations
	A-14	Air Quality Assessment
A-3		NOISE
	A-18	Applicable Noise Level Regulations
	A-22	Ambient Noise Characteristics of the Sites
A-4	A-27	AGENCIES CONTACTED
A-5	A-29	BIBLIOGRAPHY
A-6	A-31	WALLACE, FLOYD, ELLENZWEIG INC. AND BARTON-ASCHMAN ASSOCIATES STAFF
B-1	B-1	FISCAL OVERVIEW OF THE CITY OF BOSTON
B-2	B-9	REVENUE SOURCES
B-3	B-17	PUBLIC EXPENDITURES
B-4	B-23	ANNUAL REVENUE TABLES
B-5	B-33	BIBLIOGRAPHY
B-6	B-37	ECONOMICS RESEARCH ASSOCIATES STAFF

FIGURES

III-1	III-2	Planning Context (fold out)
III-2	III-5	Aerial Photograph, Charlestown
III-3	III-10	Existing Site Conditions, Charlestown
III-4	III-12	Site Zones, Charlestown
III-5	III-17	Aerial Photograph, South Boston

FIGURES	<u>Page</u>	
III-6	III-19	Existing Site Condition, South Boston
III-7	III-20	Site Zones, South Boston
III-8	III-34	Aerial View of Existing Structures, Charlestown
III-9	III-35	Aerial View of Possible New Structures
III-10	III-37	View Along Second Avenue
III-11	III-50	Aerial Perspective Package B
III-12	III-55	View of Chain Forge
III-13	III-66	Section Through Dry Dock 2
III-14	III-68	View from Waterfront
III-15	III-82	South Boston, New Industrial Construction
III-16	III-90	Container Port
IV-1	IV-1	Existing PM Peak Hour Traffic, Charlestown
IV-2	IV-16	Existing PM Peak Hour Traffic, South Boston
IV-3	IV-21	Alternative I, Charlestown
IV-4	IV-23	Alternative II, Charlestown
IV-5	IV-25	Alternative III, Charlestown
IV-6	IV-32	P.M. Peak Hour Site Traffic, Package A
IV-7	IV-38	P.M. Peak Hour Site Traffic, Package B
IV-8	IV-44	P.M. Peak Hour Site Traffic, Package C
IV-9	IV-50	P.M. Peak Hour Site Traffic, Package A
IV-10	IV-54	P.M. Peak Hour Site Traffic, Package B
IV-11	IV-58	P.M. Peak Hour Site Traffic, Shipbuilding

#### TABLES

II-1	II-1	Land Use Data: Charlestown Package A
II-2	II-4	Charlestown Building Use Package A
II-3	II-8	Land Use Data: Charlestown Package B
II-4	II-8	Charlestown Building Use Package B
II-5	II-12	Land Use Data: Charlestown Package C
II-6	II-12	Charlestown Building Use Package C
II-7	II-18	Land Use Data: South Boston Package A

<u>TABLES</u>	<u>Page</u>	
V-5	V-75	Warranted Hotel/Motel Facilities, Charlestown 1985
V-6	V-16	Pro Forma Annual Financial Statement Industrial Development (Rehabilitation)
V-7	V-17	Pro Forma Annual Financial Statement Industrial Development (New Construction)
V-8	V-17	Total Direct Revenues from Package A
V-9	V-19	Direct Expenses from Package A
V-10	V-21	Direct Revenues from Package A
V-11	V-21	Public Expenditures from Package A
V-12	V-23	Development Cost Estimates Package A
V-13	V-24	Construction Related Payroll Package A
V-14	V-24	Operation Payroll and Employment Generated Package A
V-15	V-27	Economic Impact of Employment Multiplier Package A
V-16	V-30	Hotel/Housing/Institutional Development Parameters Charlestown
V-17	V-30	Selected Housing Stock Characteristics City of Boston 1970
V-18	V-33	Number of New Dwelling Units 1960-1972
V-19	V-33	Annual Housing Production 1960-1973
V-20	V-35	Replacement Demand for Dwelling Units 1960-1973
V-21	V-35	Trends in Household Size 1950-1985
V-22	V-38	Pro Forma Annual Financial Statement Hotel Development
V-23	V-39	Pro Forma Annual Financial Statement Housing Development
V-24	V-40	Pro Forma Annual Financial Statement Industrial Development (Rehabilitation)
V-25	V-40	Total Direct Revenues Package B
V-26	V-42	Direct Expenses Package B
V-27	V-42	Direct Revenues Package B
V-28	V-44	Public Expenditures Package B
V-29	V-46	Development Cost Estimates Package B
V-30	V-47	Construction Related Payroll and Employment Generated
V-31	V-50	Operational Payroll and Employment Generated Package B
V-32	V-50	Economic Impact of the Employment Multiplier Package B

TABLES	<u>Page</u>	
II-8	II-18	South Boston Building Use Package A
II-9	II-22	Land Use Data: South Boston Package B
II-10	II-22	South Boston Building Use Package A
II-11	II-24	Transportation Summary of Charlestown
II-12	II-24	Transportation Summary of South Boston
II-13	II-26	Summary: Assessment of Environmental Impact
II-14	II-27	Summary: Boston Naval Shipyard
III-1	III-47	Package A Cost Estimates, Charlestown
III-2	III-64	Package B Cost Estimates, Charlestown
III-3	III-79	Package C Cost Estimates, Charlestown
III-4	III-88	Package A Cost Estimates, South Boston
III-5	III-96	Package B Cost Estimates, South Boston
IV-1	IV-31	Transportation Data: A Charlestown
IV-2	IV-33	Directions of Approach
IV-3	IV-35	Package A - Internal Transportation Improvements Cost
IV-4	IV-37	Transportation Data: B Charlestown
IV-5	IV-39	Directions of Approach
IV-6	IV-41	Package B - Internal Transportation Improvements Cost
IV-7	IV-43	Transportation Data: C Charlestown
IV-8	IV-45	Directions of Approach
IV-9	IV-47	Package C - Internal Transportation Improvements Cost
IV-11	IV-49	Transportation Data: A South Boston
IV-12	IV-51	Directions of Approach
IV-13	IV-52	Package A - Internal Transportation Improvements Cost
IV-14	IV-53	Transportation Data: B South Boston
IV-12	IV-55	Directions of Approach
IV-15	IV-56	Package B - Internal Transportation Improvements Cost
IV-16	IV-57	Transportation Data: Shipbuilding
V-1	V-4	Summary of Benefits and Costs
V-2	V-9	Industrial/Institutional Parameters, Charlestown
V-3	V-13	Target Industries for Shipyard Reuse Compatibility
V-4	V-14	Projected Demand for Motel/Hotel Rooms for Visitors to Charlestown 1985



TABLES	<u>Page</u>	
V-33	V-55	Hotel/Convention/Housing/Institutional Development Parameters
V-34	V-55	Estimated Distribution of Commerical Lodging, Room-Nights by Trip Type Boston 1978
V-35	V-58	Projected Demand for New Commerical Lodging in Boston 1978-1985
V-36	V-58	Estimated Market Support for Specialty Shopping 1985
V-37	V-58	Warranted Specialty Shopping, Charlestown
V-38	V-61	Pro Forma Annual Financial Statement Hotel Development
V-39	V-62	Pro Forma Annual Financial Statement Housing Development
V-40	V-63	Pro Forma Annual Financial Statement Specialty Shopping Center
V-41	V-63	Total Direct Revenues Package C
V-42	V-64	Direct Expenses Package C
V-43	V-65	Direct Revenues Package C
V-44	V-65	Public Expenditures Package C
V-45	V-66	Development Cost Estimates Package C
V-46	V-69	Construction Related Payroll and Employment Generated by Package C
V-47	V-71	Operational Payroll and Employment Generated Package C
V-48	V-71	Economic Impact of the Employment Multiplier Package C
V-49	V-74	Indicators of Industrial Activity, Boston 1972-1973
V-50	V-74	Square Foot and Percentage of Available Industrial Space, Boston
V-51	V-74	Summary of Industrial Construction 1960-1971
V-52	V-77	Direct Revenues from Package A, South Boston
V-53	V-79	Development Cost Estimates, Package A
V-54	V-79	Construction Related Payroll and Employment Generated, Package A
V-55	V-79	Economic Impact of the Employment Multiplier Package A
V-56	V-85	Direct Revenues from Package B
V-57	V-88	Development Cost Estimates for Package B
V-58	V-88	Construction Related Payroll and Employment Generated, Package B

TABLES	<u>Page</u>	
V-59	V-91	Economic Impact of Employment Multiplier Package B
A-1	A-15	Air Quality: Comparison Criteria - Indices
B-1	B-2	Analyses of Appropriations and Revenues, Boston 1971-1972
B-2	B-4	Details of General Appripriations, Boston 1971-1972
B-3	B-4	Boston's Municipal Revenue Yield
B-4	B-5	Effective Property Tax Rates
B-5	B-8	Capital Investment, Public and Private, in Boston
B-6	B-13	Revenues Generated Through Residential Development in Boston
B-7	B-13	Revenues Generated through Industrial Development in Boston
B-8	B-13	Revenues Generated through Retail Development in Boston
B-9	B-16	Revenues Generated through Hotel Development in Boston
B-10	B-16	Revenues Generated through Office Development in Boston
B-11	B-18	Average Direct Service Costs Per Capita for Residential Development at Boston Navy Yards
B-12	B-18	Direct Costs for Alternative Land Uses at the Boston Navy Yards
B-13	B-20	General Government Expense Requirements, Boston
B-14	B-20	Estimated Costs to Maintain Existing Facilities
B-15	B-23	Direct Revenues from Package A, Industrial Element
B-16	B-23	Direct Revenues from Package A, Office/Loft Element
B-17	B-24	Direct Revenues from Package A, Retail Element
B-18	B-24	Direct Revenues from Package A, Hotel Element
B-19	B-25	Direct Revenues from Package B, Hotel Element
B-20	B-25	Direct Revenues from Package B, Retail Element
B-21	B-26	Direct Revenues from Package B, Office Element
B-22	B-27	Direct Revenues from Package B, Industrial Element
B-23	B-27	Direct Revenues from Package B, Warehouse Element
B-24	B-28	Direct Revenues from Package B, Residential Element
B-25	B-28	Direct Revenues from Package B, Marina Element
B-26	B-29	Direct Revenues from Package C, Office Element

## TABLES

Page

B-27	B-29	Direct Revenues from Package C, Hotel and Convention Elements
B-28	B-30	Direct Revenues from Package C, Retail Element
B-29	B-30	Direct Revenues from Package C, Residential Element
B-30	B-31	Direct Revenues from Package C, Marina Element
B-31	B-31	Direct Revenues from Package A, South Boston
B-32	B-32	Direct Revenues from Package B, South Boston





# INTRODUCTION





## INTRODUCTION

The City of Boston is faced with an opportunity and a responsibility of extraordinary magnitude in the planning for the redevelopment of the Boston Naval Shipyard. Both the Charlestown and South Boston sites were decommissioned on July 1, 1974 and will no longer be used by the military. These 180 acres of land, which served the Navy for its building and repairing of ships, also housed Navy personnel who worked there, administered all shipbuilding and conversion repair in the First Naval District, and manufactured rope and chain for the entire Navy. To perform this work over the last 150 years, the Navy built piers, dry docks, cranes, a forge, a ropewalk, laboratories, offices, testing devices, manufacturing and processing equipment, arms production facilities, barracks and quarters, eating and entertainment facilities, and the buildings to house all of these operations. During World War II, when a new ship was launched each month, 50,000 people, mostly civilians, were employed at the Charlestown Shipyard alone.

The Charlestown site has also served as the permanent berth for the USS Constitution, the Navy's oldest commissioned ship. One-half million visitors from the United States and abroad have visited this historic ship annually in recent years.

The scale of operations at the Shipyard, the number and size of its buildings demonstrate the importance of the site as an employer, as a producer, as an historic monument, and as an influence on Boston's harbor. The closing down of Navy operations creates both the responsibility of making up for a loss of the past uses of the site, and an opportunity to guide the development of the City for several generations in the future.

The attributes of the site are an indication of some of the responsibilities inherent in its redevelopment: creation of new jobs providing steady income, additional tax base land, and the preservation of a valued historic resource to enhance the environment for City residents and to generate income from tourists.

In keeping with this responsibility, the City of Boston has formulated its goals for the reuse of the sites: Provide employment, increase tax revenues, reemploy shipyard workers, develop the port, improve adjoining neighborhoods

and provide protection of nearby communities from effects of incompatible uses. Unemployment in Boston continues at high levels. New jobs should be aimed at the resident population and in particular at those laid off by the closing of the Shipyard. The return of the land to the tax rolls will provide added income to the City, while all development should be related to harbor activities. In addition, redevelopment of the land enables steps to be taken to improve the adjoining neighborhood, as in the development of a National Historic Park in Charlestown, and to provide protection of the communities from effects of other uses by improving the transportation network. These goals must be served within the general framework of the marketability of the uses proposed for the site, and the ability of the solution to be realized. In addition to the long-term importance of the sites, it must be recognized that existing conditions of economics, politics and bureaucratic procedure are determinative of the success or failure of projects of this kind. The carrying costs of holding the land unused are substantial. Consideration must be given to interim uses and to uses which although they fulfill the goals only in a partial manner, can be accomplished in a short time.

#### PURPOSE

The purpose of this Study is to provide the City with some preliminary thinking on several different realistic options for development and reuse of the sites. This information should then aid in the immediate decision which the City faces: whether or not to acquire the land from the Federal Government.

A Phase I report presented to the Economic Development and Industrial Commission and the Boston Redevelopment Authority April 23, 1974 discussed background material along with a substantial number of possible alternative uses. These uses were organized into development packages consisting of a compatible and reinforcing set of land uses. This work is summarized at the beginning of Sections III, IV, and V. At the end of Phase I, several alternative packages were chosen for further exploration and detailing in Phase II.

There are a number of entities which play important roles in the disposition of this land. The General Services Administration will take title when the Navy leaves. Its regu-



lations concerning who may acquire the land for what purposes and at what price have been outlined in the Phase I report. In brief, the GSA first offers the land to all Federal Agencies, then to the local governments (State and City) in negotiated sale, and finally to the public in open auction.

The Commission on Federal Base Conversion was created April 17, 1973 by the Governor and the General Court to coordinate the activities of state agencies and towns in planning for the disposition of the various bases being closed around the State. Local Commissions were also established to solve the problems associated with base conversions. For the Shipyard there are the Boston Base Conversion Task Force, the Charlestown Base Conversion Advisory Committee and the South Boston Base Conversion Advisory Committee. For the purposes of this Study, EDIC and the BRA have provided liaison with these groups.

In a study running concurrently with this one, Booz-Allen, Hamilton, under contract to the City, has prepared an engineering report on the conditions of the buildings, equipment and utilities, and the costs of repairing, upgrading, or demolishing them. This information has been made available to us, and where we have used it, it has been noted as the engineer's report.

## ORGANIZATION OF REPORT

This report is organized to provide both a brief comprehensive explanation of each development alternative, for the layman, and details on which conclusions were based, for the technician.

Section II consists of an integrated summary of each alternative development package including land use, transportation, economic, and environmental aspects.

Section III treats in a more detailed manner the physical land use plan and environmental effects of each alternative.

Section IV details the transportation problems and possible solutions associated with each alternative.

Section V examines the market factors, the employment generated, and provides a public cost/benefit analysis to the City for each scheme.

## ASSUMPTIONS

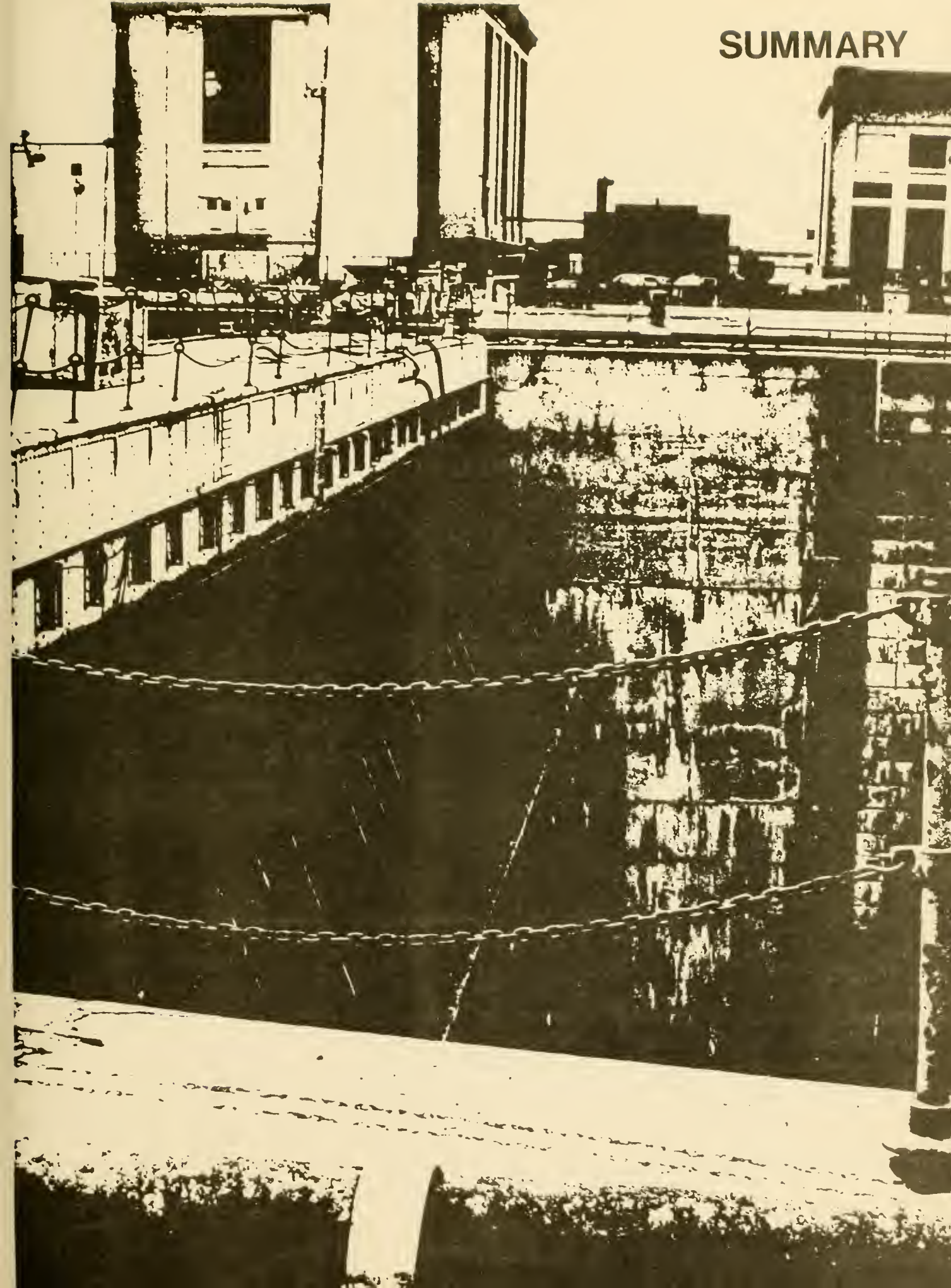
The work in this Study is based on a number of assumptions. There is currently a bill before Congress which proposes that part of the Boston Naval Shipyard be designated and developed as a National Park. Although this proposal has not yet been passed by Congress, we have assumed in all the land use packages for Charlestown that a Park of 23 land acres will be located on the southern end of the site. This Park will preserve and display the USS Constitution and will attract over a million visitors to the site annually. The uses on the remaining site have been proposed with this in mind.

In addition, the National Park will at some time wish to prevent access, to the rest of the site to the north, from passing through the Park. The circulation and access systems have been designed to avoid the Park.

There is currently a very good prospect that a local shipbuilding firm will be able to take over in stages all of the South Boston Annex and part of the Charlestown facility for the production of medium-sized product carriers and other marine equipment. Our planning does not take this future use into account. Shipbuilding may be an interim use for the site profitable only until competing modern yards have been built. The plans presented here are long-term solutions; however, Charlestown Package A (Industrial) could be used with shipbuilding substituted for industrial use. Later developments (as shown in Packages B and C) can be built onto the institutional area. The environmental problems associated with shipbuilding may be severe and must be investigated before operations begin.



# SUMMARY





## SUMMARY

### PROCESS

Three major discipline groupings have been working together to detail and evaluate the development packages proposed in this study: marketing and cost/benefit analysis, land use planning and environmental impact assessment, and transportation planning. The set of land uses were initially derived by market and land use studies in Phase I. In Phase II these decisions have been detailed: land use by physical arrangement of the uses and the services they require on the site and economic feasibility by a cost/benefit analysis. An environmental impact assessment has also been performed.

Ideally, these evaluations would next be incorporated into the proposed development packages by modification of the location, size and other details of the uses. However, the time allotted to the study has not permitted that depth of investigation. The packages stand without change for comparison and continued evaluation.

The role of transportation planning has been different for the two sites. In Charlestown substantial planning and investigation into the highway and local street problems has been done previously, making it possible to offer several design solutions to the existing problems as they are impacted by new uses of the site. In South Boston, planning is in a much more preliminary stage and the transportation solutions are not in the form of designs or alignments. More planning work, followed by design, is needed in this area.

### CHARLESTOWN

The Shipyard site in Charlestown is located between the Tobin Bridge and the harbor. It has been cut off from the nearby neighborhoods both by the Bridge and by its long history of industrial use. New uses for the site are heavily influenced by the proposed National Park on the southern end of the site and by the existing inventory of historic buildings.

Regional access to the site is quite good, and the land is near both downtown and the

airport. It is, of course, located on the waterfront, and there is currently rail access to the Shipyard. However, there are also locational drawbacks to the site. Access to the regional highway system requires a circuitous and congested route. Local streets are also heavily loaded and are in residential use. The Department of Interior, once the Park is fully operative, will want to keep the Park free of through traffic, making entry to the remainder of the site difficult, and cutting off rail service.

Charlestown has been a tourist attraction for some time, offering to its visitors not only the Constitution, but Bunker Hill, the Town Hill District, the Warren Tavern, and other historic houses and quaint streets. The possibilities for new land uses and road configurations present an opportunity to relieve some of the congestion problems caused by visitors, and to make their stay more pleasant. A pedestrian path or trail connecting places of interest is a very real possibility.

Market analysis has shown that residential, hotel, offices, and industrial uses would all meet with some success located on the site given other favorable factors. In addition, there is support for specialty shopping facilities if the National Park proposed is implemented. New development will present opportunities for new revenue to the City, and new jobs to replace those lost with the closing of the Shipyard.

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# CHARLESTOWN SITE

LAND USE AND TRANSPORTATION STUDY  
FOR THE BOSTON NAVAL SHIPYARD  
BOSTON ECONOMIC DEVELOPMENT AND INDUSTRIAL  
COMMISSION  
BOSTON REDEVELOPMENT AUTHORITY

WALLACE, FLOYD, ELLENZWEIG INC. ARCHITECTS/PLANNERS

0 100 200 400 800 FEET

INDUSTRY  
HOUSING  
HOTEL/CONVENTION  
MUSEUM  
RETAIL/RESTAURANT  
EDUCATION  
OPEN SPACE  
NATIONAL PARK  
VEHICULAR ACCESS  
P PARKING  
S SERVICE AREA  
RAIL ACCESS

NATIONAL PARK SERVICE

CHARLES RIVER

## A. INDUSTRIAL-INSTITUTIONAL

### LAND USE DATA: CHARLESTOWN PACKAGE A INDUSTRIAL/INSTITUTIONAL

TABLE II-

LAND USE	POPULA- TION	LAND AREA	BUILDINGS Sq. Ft.	REUSED Cu. Ft.	NEW CONSTRUCTION	DEMOLITION Sq. Ft.	Cu. Ft.	PARKING REQUIRED
ACCESS						75,829	2,719,301	
INSTITUTIONAL								
Museum	8,000		165,600	2,730,485		16,380	170,978	250
School	5,000		686,600	7,506,738				430
Retail			29,500	400,000				155
Hotel	200 Rms		90,000	1,379,188				150
Office/Loft			108,000	1,469,806				
Open Space					130,000 SqFt			
Parking	700-1000 <sup>2</sup>	3A	546,000	7,000,000		27,020	287,576	
Natl. Park								400
TOTAL		15A	1,625,700	20,226,217	130,000 SqFt	43,400	458,554	1,435
INDUSTRY								
Industry								
Parking	On Site	50A	1,179,000	33,100,696	130,000 SqFt	378,489	7,305,092	650
Dry Dock	Scattered					88,200		
Piers								
TOTAL		50A	1,179,000	33,100,696	130,000 SqFt	466,689	7,305,092	650

1. Area does not include basements.

2. Some parking spaces will serve several uses.

TABLE II-

### CHARLESTOWN BUILDING USE

Building	Current Use	Area In Sq. Ft.	PACKAGE A	Building	Current Use	Area In Sq. Ft.	PACKAGE A
*31	Telephone Exchange	6,073		191		1,965	Demolish
*33	Barracks	72,694	Rotel	191A		717	Demolish
*34	Laboratories	50,640	Retail - 1st Fl. Office - 2, 3	192		3,188	Demolish
*36	Sail Loft	73,309	Retail - 1st Fl. Office/Apt-2,3,4	193		7,284	Demolish
*38	Barracks	41,312	Rotel	195	Machine Shop	202,422	Industry-Part.Dem.
*39	Offices	161,227	Museum-Demolish Some	196	Machine Shop	13,125	Industry
40		54,943	Industry	197	Electronics	195,267	Industry
42	Machine Shop	354,336	Industry	199	Warehouse	544,079	Parking
*58	Ropewalk	217,657	Owned by NPS	200	Firehouse	27,531	Demolish
*60	Tar Shed	13,146	Owned by NPS	203		7,877	Demolish
*62	Ramp Storage	42,823	Owned by NPS	206		17,595	Demolish
*75	Storehouse	27,945	Industry	207		2,569	Demolish
77		3,567	Demolish	210		3,048	Demolish
*79	Storehouse	15,057	Demolish	211B		3,242	Demolish
96		5,430	Demolish	215C		4,018	Demolish
103	Sheet Metal	80,784	Demolish	217		5,428	Demolish
104	Ship Fitters	145,850	Industry	218A		6,243	Demolish
*105	Forge	65,178	Industry	224		1,039	Demolish
106	Boiler Shop	78,684	Demolish	225		301	Demolish
107		65,911	Museum	226		1,467	Demolish
108	Power Plant	46,667	Power for Industry	227		299	Demolish
114	Wood Working	79,943	Industry	228		1,340	Demolish
*120	Infirmary	25,686	Office/Loft	229		300	Demolish
*123	Pump Rouse	2,816	Facade Easement	230		1,350	Demolish
131	Flammable Storage	42,363	Demolish	231		628	Demolish
143	Chapel	1,090	Demolish	232		297	Demolish
149	Warehouse	686,630	School	233		2,205	Demolish
150	Substation	14,495	Power for Industry	266	Quarters	27,020	Demolish
155		1,946	Demolish	271		1,634	Demolish
165A		1,655	Demolish	Pier 4		39,900	Industry
179		1,762	Demolish	Pier 5		95,800	Industry
197		39,907	Industry	Pier 6		36,000	Industry
				Pier 7		94,500	Industry
				Pier 8		44,000	Industry
				Pier 9		43,200	Demolish
				Pier 10		45,000	Demolish
				Dry Dock 2			Industry
				Dry Dock 5			Fill
				Shipway 1		24,000	Demolish
				Shipway 2		45,600	Demolish

\*Historic Value



CHARLESTOWN  
PACKAGE A  
INDUSTRIAL/  
INSTITUTIONAL

Package A combines 50 acres of industrial reuse of the existing facilities with an institutional area which protects and re-uses the historic buildings. In the historic area, extraneous structures and later additions are removed to return the buildings to their original form, creating an environment suitable for pedestrian activity. The institutional (museums, school) and retail/hotel uses and open space will provide services and areas of interest to the tourist visiting the National Park. The retail space and the 200-room hotel are in renovated historic buildings. A summary of the space devoted to each use and a detailing of the reuse of each building accompanies the land use plan at left, Tables II-1 and II-2.

The industrial uses will have to be chosen to both insure compatibility with Park and institutional uses, while reusing existing structures and facilities to reduce the costs of occupying the site.

The physical design of the entire site is an important factor in marketing, with the less desirable industrial activities isolated from the commercial and institutional uses. The market support for the industrial space is uncertain, with initial estimates of at least 7 years to market the spaces. The impact of the project on the Charlestown community depends on proper selection of industrial uses, and should be given careful consideration.

This alternative has a benefit cost ratio of 1.23 and will yield 23 million in undiscounted direct net benefits, or \$4.4 million in discounted direct net benefits. The construction period will create nearly 1,300 job opportunities, while an additional 2,900 permanent employment openings will result largely from the industrial use. Further, regional spending of \$3.3 million will be generated from construction payrolls, while \$59.7 million will be generated annually from the permanent employment created.

Site preparation and improvement costs for utilities, pier demolition and repair, access, and building demolition will total \$5.5 million. These costs presumably will be considered in the assessment of the property for negotiated sale.

Traffic generation by this package is 320 inbound and 865 outbound auto trips, and 310 inbound and 1,285 outbound transit trips in the peak hour. Truck traffic generated is 45 inbound and 85 outbound. This amount of traffic would cause existing roadways to operate at a low level of service with some delays. It is recommended that an at-grade two-way connection of Water and Chelsea Streets, and a new off-ramp from the Bridge approach to Chelsea Street be constructed.

This solution is recommended as a minimum for each package in Charlestown. It necessitates the moving of an historic wall farther in on the National Park, and the taking of one bar on Chelsea Street. It will substantially reduce the burden on Lowney Way and will permit an acceptable level of service.

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CHARLESTOWN

PACKAGE B PLAN

CHARLESTOWN  
PACKAGE B  
HOUSING/INDUSTRIAL/  
INSTITUTIONAL

This alternative differs from Package A by combining a reduced amount of industrial land (28 acres) with an increased amount of retail and hotel space, and a similar treatment of the historic area. Five hundred housing units are also provided, with open space to serve the public and the residents. Dry dock 2 is flooded to bring the waterfront into the site.

The uses of a college and museums in the historic area provide a continuation of activities related to the National Park, while the hotel and retail area provide other tourist facilities. The power plant is removed to create a large plaza in the historic area.

The clustering of retail, hotel, and housing uses adjacent to the National Park site maximizes the spillover benefits attainable by placing compatible and reinforcing uses adjacent to one another. These land use elements should be absorbed into the market quickly. The industrial and warehousing uses are separated from the other land uses and therefore need not influence their marketing performance. Careful consideration, however, should be given to the types of industries occupying the site to insure their compatibility with adjoining uses. The industrial space will require five years to achieve full occupancy, assuming the creation of an attractive and dynamic industrial market. The housing, hotel and retail uses, which are new construction, could expect to attract substantial interest from private sector development concerns, assuming a stabilized financial market.

This alternative has a benefit/cost ratio of 1.38 and will generate \$45 million in undiscounted net benefits. or \$10.7 million in discounted net benefits. Non-income generating uses in the historic area reduce the net benefits substantially. A total of nearly 2,100 construction-related jobs will be created during the development period. In addition, 1,400 permanent employment opportunities will be generated by the completed facilities. Spending in the regional economy generated by the construction payrolls will add \$5.4 million annually to the Boston economy, while \$27.5 million will result annually from permanent employment payrolls.



# CHARLESTOWN SITE

LAND USE AND TRANSPORTATION STUDY  
FOR THE BOSTON NAVAL SHIPYARD

BOSTON ECONOMIC DEVELOPMENT AND INDUSTRIAL  
COMMISSION  
BOSTON REDEVELOPMENT AUTHORITY

WALLACE, FLOYD, ELLENZWEIG INC. ARCHITECTS/PLANNERS

0 100 200 400 800 FEET

INDUSTRY  
HOUSING  
HOTEL/CONVENTION  
MUSEUM  
RETAIL/RESTAURANT  
EDUCATION  
OPEN SPACE  
NATIONAL PARK  
VEHICULAR ACCESS  
P PARKING  
S SERVICE AREA  
RAIL ACCESS

PATH TO MONUMENT SQUARE

DEVELOP PARK

NATIONAL PARK SERVICE

CHARLES RIVER

B. HOUSING-INDUSTRIAL  
INSTITUTIONAL

LAND USE DATA: CHARLESTOWN PACKAGE B HOUSING/INDUSTRIAL/INSTITUTIONAL TABLE II-3

LAND USE	POPULATION	LAND AREA	BUILDINGS REUSED Sq. Ft.	Cu. Ft.	NEW CONSTRUCTION	DEMOLITION Sq. Ft.	Cu. Ft.	PARKING REQUIRED
ACCESS						75,829	2,719,301	
INSTITUTIONAL College	1100 or 1600		301,000 <sup>2</sup>	3,616,585 <sup>3</sup>		16,380	170,978	500
College Hsg	70 du		164,000	847,698				Inc. Above
Museum	8000		248,000	4,595,284		3,195	31,950	250
Open Space		6A			259,000 SqFt	46,669	1,939,365	
Parking	700-1000 <sup>4</sup>		686,000	7,606,238				400
Natl. Park								
Retail			19,000					
Office/Loft			26,000	321,316				
TOTAL		15A	1,444,000	16,987,121	259,000 SqFt	142,073	4,861,597	1,150
COMMER. & HSG.								
Housing	500 du	10A			500 du			600
Retail					60,000 SqFt			535
Marina	200 Boat	7A w/water			Floating Docks	700,392	22,960,573	150
Hotel	400 Rms				400 Rooms			300
Open Space		8.8A			383,000 SqFt			
Parking	950 <sup>3</sup>				304,000 SqFt			
TOTAL						700,392	22,960,573	1,585
INDUSTRY								
Industry		28A	372,000	10,750,000		131,000	1,660,000	225
Warehouse			554,000	7,000,000				
Piers						88,200		
Dry Dock								
TOTAL		28A	925,500	17,750,000		221,000	1,660,000	225

1. Area does not include basements.
2. An additional 77,000 Sq.Ft. can be used from Building 149.
3. An additional 1,540,000 Cu.Ft. can be used from Building 149.
4. Some parking spaces will serve several uses.

CHARLESTOWN BUILDING USE

TABLE II-4

Building	Current Use	Area In Sq. Ft.	PACKAGE B	Building	Current Use	Area In Sq. Ft.	PACKAGE B
*31	Telephone Exchange	6,873		191		1,965	Demolish
*33	Barracks	72,694	Museum	191A		717	Demolish
*34	Laboratories	50,640	Museum	192		3,188	Demolish
*36	Sail Loft	73,309		193		7,284	Demolish
*38	Barracks	41,312	Museum	195	Machine Shop	202,422	Demolish
*39	Offices	161,227	College-Demolish Some	196	Machine Shop	13,125	Demolish
40		54,943	Demolish	197	Electronics	196,267	Demolish
42	Machine Shop	354,336	Demolish	199	Warehouse	544,079	Industry
*58	Hopewalk	217,657	Demolish: 494,000 cu.ft. College: 187,209 cu.ft. Coll. Hsg: 847,700 cu.ft.	200	Firehouse	27,531	Demolish
*60	Tar Shed	13,146	Facade Easement	203		7,877	Demolish
*62	Hemp Storage	42,823	College	206		17,595	Demolish
*75	Storehouse	27,045	Industry	207		2,569	Demolish
77		3,567	Demolish	210		3,048	Demolish
*79	Storehouse	15,057	Demolish	211B		3,242	Demolish
96		5,430	Demolish	215C		4,018	Demolish
103	Sheet Metal	80,784	Demolish	217		5,428	Demolish
104	Ship Fitters	145,850	Industry	218A		6,243	Demolish
*105	Forge	65,178	Museum or Industry	224		1,039	Demolish
106	Boiler Shop	78,684	Industry	225		301	Demolish
107		65,911	College	226		1,467	Demolish
108	Power Plant	46,667	Demolish	227		298	Demolish
114	Wood Working	79,943	Industry	228		1,340	Demolish
*120	Infirmary	25,686	Office/Loft	229		300	Demolish
*123	Pump House	2,816	Facade Easement	230		1,350	Demolish
131	Flammable Storage	42,363	Demolish	231		628	Demolish
143	Chapel	1,090	Demolish	232		297	Demolish
149	Warehouse	686,630	Parking and College	233		2,205	Demolish
150	Substation	14,405	Substation	266	Quarters	27,020	Demolish
165		1,946	Demolish	271		1,634	Demolish
165A		1,655	Demolish	Pier 4		39,900	Open Space
178		1,762	Demolish	Pier 5		85,800	Open Space
187		39,907	Industry	Pier 6		36,000	Open Space
				Pier 7		94,500	Marina
				Pier 8		44,000	Open Space
				Pier 9		43,200	Demolish
				Pier 10		45,000	Demolish
				Dry Dock 2			Flood
				Dry Dock 5			Fill
				Shipway 1		24,000	Demolish
				Shipway 2		45,600	Demolish

\*Historic Value



CHARLESTOWN  
PACKAGE B  
HOUSING/INDUSTRIAL/  
INSTITUTIONAL

This alternative differs from Package A by combining a reduced amount of industrial land (28 acres) with an increased amount of retail and hotel space, and a similar treatment of the historic area. Five hundred housing units are also provided, with open space to serve the public and the residents. Dry dock 2 is flooded to bring the waterfront into the site.

The uses of a college and museums in the historic area provide a continuation of activities related to the National Park, while the hotel and retail area provide other tourist facilities. The power plant is removed to create a large plaza in the historic area.

The clustering of retail, hotel, and housing uses adjacent to the National Park site maximizes the spillover benefits attainable by placing compatible and reinforcing uses adjacent to one another. These land use elements should be absorbed into the market quickly. The industrial and warehousing uses are separated from the other land uses and therefore need not influence their marketing performance. Careful consideration, however, should be given to the types of industries occupying the site to insure their compatibility with adjoining uses. The industrial space will require five years to achieve full occupancy, assuming the creation of an attractive and dynamic industrial market. The housing, hotel and retail uses, which are new construction, could expect to attract substantial interest from private sector development concerns, assuming a stabilized financial market.

This alternative has a benefit/cost ratio of 1.38 and will generate \$45 million in undiscounted net benefits. or \$10.7 million in discounted net benefits. Non-income generating uses in the historic area reduce the net benefits substantially. A total of nearly 2,100 construction-related jobs will be created during the development period. In addition, 1,400 permanent employment opportunities will be generated by the completed facilities. Spending in the regional economy generated by the construction payrolls will add \$5.4 million annually to the Boston economy, while \$27.5 million will result annually from permanent employment payrolls.

Costs for site preparation items such as utilities, pier demolition and repair, access, building demolition, will total \$8.1 million. These costs will presumably be considered in the assessment of the property for negotiated sale as necessary costs to ready the site for reuse.

Traffic generated by this package is 680 inbound and 955 outbound auto trips, and 340 inbound and 715 outbound transit trips in the peak hour. Truck traffic generated is 50 inbound and 90 outbound. This amount of traffic would cause existing roadways to operate very poorly, and some through traffic would use neighborhood streets. The solution outlined in Package A would provide an acceptable level of service with some delays during the peak hour.

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CHARLESTOWN

PACKAGE C PLAN

CHARLESTOWN  
PACKAGE C  
HOTEL/CONVENTION/  
HOUSING/INSTITUTIONAL

The proposals in this package produce an intensively used site with extensive development of new uses. On the eastern end of the site there are 1000 units of high-income housing along the waterfront, and deeper in the site. Close to the National Park, but still on the waterfront is a 1000-room hotel and convention center. Specialty retail space and a marina serve the visitors to the site as well as the residents. As in Package B the dry dock is flooded permanently and the power plant is removed. Uses in the historic area continue to be a college, museums, and some retail space. An extensive open space system connects all the elements to each other and to the waterfront. The tables accompanying the land use diagram at left detail the space allocated to each use, and the reuse plan for each building.

The type and quality of uses proposed are highly compatible and mutually reinforcing from a market standpoint drawing support from each other and complementing each other as well as the proposed National Park. Further, there would be spillover benefits from this project both for Charlestown and the City of Boston. The project could be marketed successfully over a seven-year period, providing that a unified new environment can be created. The hotel element of this redevelopment effort could expect to attract substantial interest from development firms in the private sector, while the housing element would require additional support from the City to be made attractive to the private sector.

This alternative has a benefit/cost ratio of 2.47. Net direct benefits will be \$196 million in undiscounted dollars, or \$46.6 million in discounted net direct benefits. In addition, a total of 4,400 jobs will be created over the construction period. There will also be nearly 1,200 permanent job opportunities generated by the completed facilities. Spending in the regional economy generated by the construction payrolls will add \$11.5 million annually to the Boston economy, while another \$20.2 million will result annually from permanent employment payrolls.

Costs for site preparation for items such as utilities, pier demolition and repair, access, building demolition will total



# CHARLESTOWN SITE

LAND USE AND TRANSPORTATION STUDY  
FOR THE BOSTON NAVAL SHIPYARD

BOSTON ECONOMIC DEVELOPMENT AND INDUSTRIAL  
COMMISSION  
BOSTON REDEVELOPMENT AUTHORITY

WALLACE, FLOYD, ELLENZWEIG INC. ARCHITECTS/PLANNERS

0 100 200 400 800 FEET

INDUSTRY  
HOUSING  
HOTEL/CONVENTION  
MUSEUM  
RETAIL/RESTAURANT  
EDUCATION  
OPEN SPACE  
NATIONAL PARK  
VEHICULAR ACCESS  
P  
S  
PARKING  
SERVICE AREA  
RAIL ACCESS

NATIONAL PARK SERVICE

C. HOTEL-CONVENTION  
HOUSING-INSTITUTIONAL

LAND USE DATA: CHARLESTOWN PACKAGE C HOTEL/CONVENTION/HOUSING/INSTITUTIONAL TABLE II-5

LAND USE	POPULATION	LAND AREA	BUILDINGS REUSED Sq. Ft.	Cu. Ft.	NEW CONSTRUCTION	DEMOLITION Sq. Ft.	Cu. Ft.	PARKING REQUIRED
ACCESS						75,829	2,719,301	
INSTITUTIONAL	1100 or College College Hsg Museum Retail Open Space Parking Nat'l. Park Loft/Office	7A	302,000 <sup>2</sup> 191,000 161,000 43,000 273,000 149,000	4,384,000 <sup>3</sup> 847,000 4,623,000 256,000 3,500,000 4,238,000	90,000 SqFt 40,000 SqFt 309,000 SqFt	347,000 362,000 41,000		500 inc. above 125 See Retl. 400
TOTAL		15A	1,289,000	17,848,000	439,000 SqFt	826,000		1,025
HOTEL/CONV.	Retail Hotel Convention Parking Open Space Marina	12A 8.8A 7A w/water	180,000	7,500,000	60,000 SqFt 400,000 SqFt 336,000 SqFt	476,089	12,524,896	270 540 150
TOTAL		23A	180,000	8,000,000	796,000 SqFt	476,089	12,524,896	960
HOUSING	Housing Parking Comm Fac Open Space	20A 5A	63,000 27,000	1,189,350 652,333	950,000 SqFt	328,434 <sup>5</sup>	36,923,672 <sup>5</sup>	1,200
TOTAL		25A	90,000	1,842,000	950,000 SqFt	328,434	36,923,672	1,200

1. Area does not include basements.
2. An additional 68,311 Sq. Ft. can be used from Building 199.
3. An additional 1,116,287 Cu. Ft. can be used from Building 199.
4. Some parking spaces will serve several uses.
5. Includes filled Dry Dock 5.

CHARLESTOWN BUILDING USE

TABLE II-6

Building	Current Use	Area In Sq. Ft.	PACKAGE C	Building	Current Use	Area In Sq. Ft.	PACKAGE C
*31	Telephone Exchange	6,873		187		39,907	Demolish
*33	Barracks	72,694	Retail - 1st Floor Loft/Office - 2, 3	191		1,965	Demolish
*34	Laboratories	50,640	Retail - 1st Floor Loft/Office - 2, 3	191A		717	Demolish
*36	Sail Loft	73,309	Retail - 1st Floor Loft/Office - 2, 3	192		3,188	Demolish
*38	Barracks	41,312	College	193		7,284	Demolish
*39	Offices	161,227	Museum-Demolish Some	195	Machine Shop	202,422	Demolish
40		54,943	Demolish	196	Machine Shop	13,125	Demolish
42	Machine Shop	354,336	Demolish Some Convention Center	197	Electronics	196,267	Demolish
*58	Ropewalk	217,657	Demolish: 494,000 cu.ft. College: 187,209 cu.ft. Coll. Hsg: 847,700 cu.ft.	199	Warehouse	544,079	Parking
*60	Tar Shed	13,146	Facade Easement	200	Firehouse	27,531	Demolish
*62	Hemp Storage	42,823	College	203		7,877	Demolish
*75	Storehouse	27,045	Community Facilities	206		17,595	Demolish
77		3,567	Demolish	207		2,569	Demolish
*79	Storehouse	15,057	Demolish	210		3,048	Demolish
96		5,430	Demolish	211B		3,242	Demolish
103	Sheet Metal	80,784	Housing	215C		4,018	Demolish
104	Ship Fitters	145,850	Demolish	217		5,428	Demolish
*105	Forge	65,178	Museum	218A		6,243	Demolish
106	Boiler Shop	78,684	Demolish	224		1,039	Demolish
107		65,911	College	225		301	Demolish
108	Power Plant	46,667	Demolish	226		1,467	Demolish
114	Wood Working	79,943	College	227		298	Demolish
*120	Infirmary	25,686	Office/Loft	228		1,340	Demolish
*123	Pump House	2,816	Facade Easement	229		300	Demolish
131	Flammable Storage	42,363	Demolish	230		1,350	Demolish
143	Chapel	1,090	Demolish	231		628	Demolish
149	Warehouse	686,630	Demolish	232		297	Demolish
150	Substation	14,405	Substation	233		2,205	Demolish
165		1,946	Demolish	266	Quarters	27,020	College
165A		1,655	Demolish	271		1,634	Demolish
178		1,762	Demolish	Pier 4		39,900	Open Space
				Pier 5		85,800	Marina
				Pier 6		36,000	Marina
				Pier 7		94,500	Marina
				Pier 8		44,000	Open Space
				Pier 9		43,200	Demolish
				Pier 10		45,000	Demolish
				Dry Dock 2			Flood
				Dry Dock 5			Fill
				Shipway 1		24,000	Demolish
				Shipway 2		45,600	Demolish

\*Historic Value



CHARLESTOWN  
PACKAGE C  
HOTEL/CONVENTION/  
HOUSING/INSTITUTIONAL

The proposals in this package produce an intensively used site with extensive development of new uses. On the eastern end of the site there are 1000 units of high-income housing along the waterfront, and deeper in the site. Close to the National Park, but still on the waterfront is a 1000-room hotel and convention center. Specialty retail space and a marina serve the visitors to the site as well as the residents. As in Package B the dry dock is flooded permanently and the power plant is removed. Uses in the historic area continue to be a college, museums, and some retail space. An extensive open space system connects all the elements to each other and to the waterfront. The tables accompanying the land use diagram at left detail the space allocated to each use, and the reuse plan for each building.

The type and quality of uses proposed are highly compatible and mutually reinforcing from a market standpoint drawing support from each other and complementing each other as well as the proposed National Park. Further, there would be spillover benefits from this project both for Charlestown and the City of Boston. The project could be marketed successfully over a seven-year period, providing that a unified new environment can be created. The hotel element of this redevelopment effort could expect to attract substantial interest from development firms in the private sector, while the housing element would require additional support from the City to be made attractive to the private sector.

This alternative has a benefit/cost ratio of 2.47. Net direct benefits will be \$196 million in undiscounted dollars, or \$46.6 million in discounted net direct benefits. In addition, a total of 4,400 jobs will be created over the construction period. There will also be nearly 1,200 permanent job opportunities generated by the completed facilities. Spending in the regional economy generated by the construction payrolls will add \$11.5 million annually to the Boston economy, while another \$20.2 million will result annually from permanent employment payrolls.

Costs for site preparation for items such as utilities, pier demolition and repair, access, building demolition will total

\$9.7 million. These costs will presumably be considered in the assessment of the property for negotiated sale as necessary costs to prepare the site for reuse.

Traffic generated by this package is 905 inbound and 1110 outbound auto trips and 525 inbound and 630 outbound transit trips in the peak hours. Truck traffic generated is 30 inbound and 50 outbound. This large amount of traffic would not only overload the capacity of the existing road system, but would also cause congestion on neighborhood streets. The solution outlined in Package A would provide a satisfactory level of service but some delay would be experienced.

## SOUTH BOSTON

The South Boston Naval Annex is located in the industrial area of South Boston, on the harbor and adjacent to and west of the Army Base. Its reuse is limited by the noise from Logan Airport which makes the site unsuitable for residential development. The site is also quite removed from any nearby community, making it difficult to provide neighborhood services, but enhancing its value as industrial land. The land is fill, and therefore flat and suitable for industrial buildings. The site has a significant amount of open land, and none of the congestion problems experienced in the Charlestown site.

The site is close to the airport and to downtown, and is well served by the regional transportation network. Problems of access do arise because of the necessity of crossing Fort Point Channel. The Northern Avenue Bridge is due to be replaced. Summer Street and its bridge will provide major access to the site. The eastern end of Northern Avenue which would provide a second point of entry to the site is currently under dispute over ownership and rights-of-way. Access will be greatly improved if a right-of-way can be maintained.

If Charlestown is developed as an industrial site, the two sections of the Shipyard will be in competition in a rather sluggish industrial market. Care should be taken that in planning for the two sites, this situation is not permitted to develop.



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SOUTH BOSTON

PACKAGE A PLAN

SOUTH BOSTON  
PACKAGE A  
INDUSTRIAL PARK

This proposal assumes that the City will act as an industrial developer, dividing the site into suitable parcels, providing the necessary infrastructure and seeking tenants or purchasers for the land. The entire area is to be used for industrial purposes, with the existing large dry dock maintained as a ship repair facility.

The marketing of the industrial space depends on the quality of the development and market conditions when the space is offered. At least a six-year leasing period seems appropriate.

This alternative has a benefit/cost ratio of 1.56 and will yield \$32 million in undiscounted direct net tax revenues to the City, or \$5.9 million in discounted direct tax benefits. The construction period will create a total of 420 job openings, while the industrial park itself would contain an estimated 2,100 employees. The construction payrolls will generate an additional \$1.1 million in regional spending in the Boston economy, while \$43.9 million in regional spending will be generated annually from the permanent employment created.

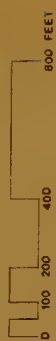
Site preparation and improvement costs for utilities, pier demolition and repair, bulkhead repair, access, and building demolition will total \$6.9 million. These costs presumably will be considered in the assessment of the property for negotiated sale as necessary costs to ready the site for reuse.

Traffic generated in this package is 220 inbound and 720 outbound auto trips and 170 inbound and 575 outbound transit trips in the peak hour. Truck traffic generated is 25 inbound and 50 outbound. This level of traffic can be adequately handled by the existing road system.

# SOUTH BOSTON ANNEX

LAND USE AND TRANSPORTATION STUDY  
FOR THE BOSTON NAVAL SHIPYARD  
BOSTON ECONOMIC DEVELOPMENT AND INDUSTRIAL  
COMMISSION  
BOSTON REDEVELOPMENT AUTHORITY

WALLACE, FLOYD, ELLENZWEIG, INC. ARCHITECTS/PLANNERS



INDUSTRY  
CONTAINER PORT  
CONTAINER PORT FILL  
ACCESS  
RAIL ACCESS



## A. INDUSTRIAL PARK

LAND USE DATA: SOUTH BOSTON PACKAGE A INDUSTRIAL PARK

TABLE II-7

LAND USE	POPULATION	LAND AREA	BUILDINGS REUSED		NEW CONSTRUCTION	DEMOLITION		PARKING REQUIRED
			Sq. Ft.	Cu. Ft.		Sq. Ft.	Cu. Ft.	
Industry		77.0	852,000	23,375,000	345,000 SqFt	495,000	11,513,000	1,500 - 2,700
Piers						376,000		
TOTALS		77.0	852,000	23,375,000		871,000	11,513,000	1,500 - 2,800

SOUTH BOSTON BUILDING USE TABLE II-8

Building	Use	Area In Sq. Ft.	Volume In Cu. Ft.	Industrial Ph.
1	Pump House	11,123	424,625	Dry Dock
14	Sub Station	1,420	29,367	Sub Station
15	Quarters	13,502	123,723	Demolish
15A	Garage	1,129	3,003	Demolish
16	Storage	159,253	5,276,084	Industry
17	Vehicle Storage	25,942	701,167	Industry
18	Ship Repair	114,197	3,442,063	Industry
19	Storage	149,382	2,576,249	Demolished
20	Heating Plant	15,738	317,850	Heating Plant
21	Offices	76,387	851,599	Office-Demolish
22	Toilet	4,840	71,390	Demolish
23	Toilet	1,574	27,663	Demolish
28	Vehicle Maint.	22,148	397,192	Industry
29	Fire Station	24,529	299,996	Demolish
30	Warehouse	174,405	7,151,300	Demolish
31	Warehouse	80,073	2,408,815	Industry
32	Warehouse	359,854	4,126,835	Industry
38	Sub Station	4,737	95,851	Sub Station
39	Sub Station	1,672	22,619	Demolish
40	Scale	701	7,088	Scale
46	Office	41,325	523,743	Demolish
49	Maintenance	43,626	545,279	Industry
53	Storage	10,754	3,180,561	Industry
54	Warehouse	36,146	610,658	Industry
56	Storage	34,166	429,093	Demolish
57	Storage	2,545	35,636	Demolish
79	Pump Station	1,645	30,023	Demolish
88	Storage	3,358	43,457	Demolish
89		104	1,027	Demolish
94		177	1,773	Demolish
Pier 1		80,000		Demolish
Pier 2		80,000		Demolish
Pier 3		80,000		Demolish
Pier 4		80,000		Demolish
Pier 5		81,000		Dry Dock
Pier 6		81,000		Dry Dock
Pier 7		54,000		Demolish

SOUTH BOSTON  
PACKAGE A  
INDUSTRIAL PARK

This proposal assumes that the City will act as an industrial developer, dividing the site into suitable parcels, providing the necessary infrastructure and seeking tenants or purchasers for the land. The entire area is to be used for industrial purposes, with the existing large dry dock maintained as a ship repair facility.

The marketing of the industrial space depends on the quality of the development and market conditions when the space is offered. At least a six-year leasing period seems appropriate.

This alternative has a benefit/cost ratio of 1.56 and will yield \$32 million in undiscounted direct net tax revenues to the City, or \$5.9 million in discounted direct tax benefits. The construction period will create a total of 420 job openings, while the industrial park itself would contain an estimated 2,100 employees. The construction payrolls will generate an additional \$1.1 million in regional spending in the Boston economy, while \$43.9 million in regional spending will be generated annually from the permanent employment created.

Site preparation and improvement costs for utilities, pier demolition and repair, bulkhead repair, access, and building demolition will total \$6.9 million. These costs presumably will be considered in the assessment of the property for negotiated sale as necessary costs to ready the site for reuse.

Traffic generated in this package is 220 inbound and 720 outbound auto trips and 170 inbound and 575 outbound transit trips in the peak hour. Truck traffic generated is 25 inbound and 50 outbound. This level of traffic can be adequately handled by the existing road system.





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FOLD-OUT

SOUTH BOSTON

PACKAGE B PLAN

SOUTH BOSTON  
PACKAGE B  
CONTAINER PORT/  
INDUSTRIAL PARK

In this Package, the industrial park is reduced to 42 acres, to allow development of a container port facility on the northern end of the site. In the first phase, 24 acres of existing land would be devoted to this use. In the second phase the area behind the pierhead line would be filled to create approximately 30 acres of land for storage of the containers. At least a five-year period should be planned prior to full occupancy of the industrial site.

This alternative has a benefit/cost ratio of 1.52 and will yield \$27.1 million in undiscounted direct tax benefits, and \$4.8 million in discounted benefits. The development period will create a total of 320 job openings, while the industries themselves will employ 1,800 persons. The construction payroll will generate an additional \$832,000 in regional spending in the Boston economy, while \$37.1 million in regional spending will be generated annually from the permanent employment created.

Site preparation and improvement costs for utilities, pier demolition and repair, access, and building demolition will total \$5.0 million. These costs presumably will be considered in the assessment of the property for negotiated sale.

Traffic generated in this package is 304 inbound and 970 outbound auto trips and 175 inbound and 560 outbound transit trips in the peak hours. Truck traffic generated is 75 trucks inbound and 115 outbound in the peak hours. This traffic is somewhat heavier than that in Package A, but it can still be handled by the existing roadway system.

SHIPBUILDING

The use of the Annex for shipbuilding was examined, at the request of the City, only from a transportation point of view. See Section IV, Transportation for relevant findings.

# SOUTH BOSTON ANNEX

LAND USE AND TRANSPORTATION STUDY  
FOR THE BOSTON NAVAL SHIPYARD  
BOSTON ECONOMIC DEVELOPMENT AND INDUSTRIAL  
COMMISSION  
BOSTON REDEVELOPMENT AUTHORITY

WALLACE, FLOYD, ELLENZWEIG INC. ARCHITECTS/PLANNERS



INDUSTRY  
CONTAINER PORT  
CONTAINER PORT FILL  
ACCESS  
RAIL ACCESS



## B. CONTAINER PORT-INDUSTRIAL PARK

LAND USE DATA: SOUTH BOSTON PACKAGE B CONTAINER PORT/INDUSTRIAL PARK

TABLE II-9

LAND USE	POPULATION	LAND AREA	BUILDINGS REUSED Sq. Ft. Cu. Ft.	NEW CONSTRUCTION	DEMOLITION Sq. Ft. Cu. Ft.	PARKING REQUIRED
Container		24.0			676,000 8,695,000	300
Industry		53	863,000 14,979,000	230,000 SqFt	336,000 8,902,000	1,260
TOTALS		77.0	863,000 14,979,000		1,012,000 17,597,000	1,560

SOUTH BOSTON BUILDING USE TABLE II-10

Building	Dem	Area In Sq. Ft.	Volume In Cu. Ft.	Industrial Park/ Container Port
1	Pump House	11,123	424,425	Dry Dock
14	Sub Station	1,420	29,367	Sub Station
15	Quarters	13,502	123,723	Demolish
15A	Garage	1,125	13,003	Demolish
16	Storage	159,253	5,276,084	Demolish
17	Vehicle Storage	25,943	701,107	Industry
18	Ship Repair	114,197	3,442,063	Industry
19	Storage	149,382	2,576,249	Demolished
20	Heating Plant	15,738	317,850	Heating Plant
21	Offices	78,387	861,599	Dry Dock-Demolish Half
22	Toilet	4,440	71,390	Demolish
23	Toilet	1,574	27,683	Demolish
24	Vehicle Maint.	22,148	397,192	Industry
29	Fire Station	24,529	299,996	Demolish
30	Warehouse	174,405	7,151,300	Industry
31	Warehouse	80,073	2,408,815	Demolish
32	Warehouse	259,854	4,128,835	Industry
34	Sub Station	6,737	95,851	Sub Station
39	Sub Station	1,472	22,619	Demolish
40	Scale	701	7,088	Scale
48	Office	41,325	523,743	Demolish
49	Maintenance	43,424	545,279	Industry
53	Storage	10,754	3,184,561	Industry
54	Warehouse	36,146	410,858	Demolish
56	Storage	34,164	425,093	Demolish
57	Storage	2,545	35,836	Demolish
79	Pump Station	1,645	30,023	Demolish
88	Storage	3,358	43,857	Demolish
89		104	1,027	Demolish
94		177	1,773	Demolish
Pier 1		80,000		Demolish
Pier 2		80,000		Demolish
Pier 3		80,000		Demolish
Pier 4		80,000		Demolish
Pier 5		81,000		Dry Dock
Pier 6		81,000		Dry Dock
Pier 7		56,000		Demolish

SOUTH BOSTON  
PACKAGE B  
CONTAINER PORT/  
INDUSTRIAL PARK

In this Package, the industrial park is reduced to 42 acres, to allow development of a container port facility on the northern end of the site. In the first phase, 24 acres of existing land would be devoted to this use. In the second phase the area behind the pierhead line would be filled to create approximately 30 acres of land for storage of the containers. At least a five-year period should be planned prior to full occupancy of the industrial site.

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SHIPBUILDING

The use of the Annex for shipbuilding was examined, at the request of the City, only from a transportation point of view. See Section IV, Transportation for relevant findings.



TRANSPORTATION  
SUMMARY

The following charts summarize traffic generation and impacts on the two sites.

TABLE II-11

TRANSPORTATION DATA SHEET--SUMMARY OF CHARLESTOWN

Development Packages	Generation Potential		Truck Generation		Transit Generation (Person Trips)		Parking Needs
	Auto Generation Inbound	Auto Generation Outbound	Inbound	Outbound	Inbound	Outbound	
A. Industrial/Institutional	320	865	45	85	310	1,285	1,605
B. Housing/Industrial/Institutional	680	955	50	90	340	715	2,340
C. Hotel/Convention/Housing Institutional	905	1,110	30	50	525	630	3,110
Resulting Conditions							

	Existing Roadways	Water/Chelsea Connection	Freeway Ramp System
A. Industrial/Institutional	At Capacity. Would operate at low level of service with some delays.	Under capacity. Would operate at acceptable level of service.	At capacity. Some delay likely.
B. Housing/Industrial/Institutional	Over capacity. Would operate very poorly. Neighborhood penetration likely.	Nearing capacity. Would operate at acceptable level of service with some delays likely.	At capacity. Some delay likely.
C. Hotel/Convention/Housing Institutional	Over capacity. Would operate very poorly. Significant congestion within neighborhoods.	At capacity. Would operate satisfactorily but at low level, moderate delays likely.	Over capacity. Delay very likely.

TABLE II-12

TRANSPORTATION DATA SHEET--SUMMARY OF SOUTH BOSTON

Land use	Auto Generation		Truck Generation		Transit Generation		Parking Needs
	In	Out	In	Out	In	Out	
Package A. Industrial	220	720	25	50	170	575	1,500
Package B. Container Port/Industrial	305	970	75	115	175	560	1,810
Shipbuilding	350	1,175	30	60	275	940	2,700

## IMPLEMENTATION OF TRANSPORTATION PLANS

There are a number of transportation projects, both short term and long term, which should be accomplished in order to improve accessibility of the two sites.

In Charlestown, local streets should be modified to provide a two-way connection between Chelsea and Water Streets. This will permit the use of Gate 5 as main entrance to the site. Because of the improvements scheduled by the National Park, these plans should be coordinated, and can be accomplished with a minimum of lead time.

An existing off-ramp from the Tobin Bridge approach can also be opened to provide access from the freeway system to the site via Chelsea Street without going through City Square. This improvement is also short term and can be accomplished easily.

A long range solution must be developed for continued rail access to the site. It appears that a rail connection across the Little Mystic is an unlikely solution at this time.

In South Boston, the Northern Avenue Bridge should be rebuilt to provide access along Northern Avenue. This street should be kept open to public traffic in order to best serve the needs of the industrial concerns on the Annex site. The Summer Street bridges also need repair in order to continue adequate service. The Seaport Access Road needs further planning, but in principle it will relieve the community streets of some industrial traffic, and will provide the area with a direct link with the regional highway system.

## ASSESSMENT OF ENVIRONMENTAL IMPACT

Table II-13 summarizes the effect each package will have on various categories of impact. The categories are fully explained in Section III.

## SUMMARY: BOSTON NAVAL SHIPYARD

This summary chart (Table II-14) illustrates some of the main results of this study in a manner which permits comparison of the proposed packages. Project Construction Costs, Required Site Improvement Costs, Developer Holding Costs, Permanent Jobs Generated, Regional Spending Generated, Property Tax Generated, Net Benefit to the City, and Market Potential are drawn from Section II, Economic Analysis and Marketability. Land Costs or Site Acquisition Costs are not included in these figures.

TABLE II-13

	CHARLESTOWN			SOUTH BOSTON	
	A	B	C	A	B
PUBLIC FACILITIES AND SERVICES	No severe impact; Some increased pressure on open space & schools.	More substantial impact; Increased pressure on open space.	Substantial impact; Some pressure on open space & schools.	Low impact.	Low impact.
COMMUNITY RESOURCES	Low impact; New trade school provided.	Some impact; New college provided.	Some impact; New college provided.	Some demand for open space.	Some demand for open space.
DEMOGRAPHIC CHANGES	Some increased demand for moderate income housing.	Increased demand for housing.	Increased demand for housing.	Some increased demand for housing.	Some increased demand for housing.
TRANSPORTATION (with recommended improvements)	Under capacity.	Nearing capacity.	At capacity.	Under capacity.	Under capacity.
ECONOMIC (Permanent jobs)	2,900	1,424	1,185	2,089	1,766
AESTHETIC	Some up-grading of historic area; No change on rest of site.	Upgrading of historic area; Creation of new waterfront area; No change in industrial area.	Upgrade historic area; Complete alteration to modern high and low rise development on rest of site.	No change.	No change.
HISTORIC	Some non-historic structures removed; Wall moved; One 1852 building removed.	Some non-historic structures removed; Wall moved; One 1852 building removed; West end of Ropewalk removed.	Most non-historic structures removed; West end of Ropewalk removed.	Not applicable.	Not applicable.
WATER QUALITY	Not calculated.	Not calculated.	Not calculated.	Not calculated.	Not calculated.
AIR QUALITY	Low Impact	Moderate	Heavy Impact	Low Impact	Low Impact
NOISE	Institutional area heavily impacted.	Institutional area somewhat impacted.	Institutional area somewhat impacted.	Levels permissible for industrial use.	Levels permissible for industrial use.

SUMMARY: BOSTON NAVAL SHIPYARD

TABLE II-14

	CHARLESTOWN			SOUTH BOSTON	
	A	B	C	A	B
PROJECT CONSTRUCTION COST <sup>1/</sup>	\$32,863,000	\$59,738,000	\$127,824,000	\$ 6,763,000	\$ 5,402,000
REQUIRED SITE IMPROVEMENT COSTS <sup>2/</sup>	\$ 5,466,000	\$ 8,134,000	\$ 9,677,000	\$ 6,941,000	\$ 5,032,000
DEVELOPER HOLDING COSTS (per annum) <sup>3/</sup>	\$ 1,262,000	\$ 1,062,000	\$ 625,000	\$ 383,000	\$ 388,000
PERMANENT JOBS	2,900	1,424	1,185	2,090	1,765
REGIONAL SPENDING GENERATED (Annual)	\$59,704,000	\$27,564,000	\$ 20,202,000	\$43,870,000	\$37,086,000
PROPERTY TAX GENERATED (Total for Life of Project, 40 Years)	\$69,800,000	\$129,200,000	\$273,500,000	\$57,400,000	\$48,300,000
NET OPERATING BENEFITS TO CITY (6% Discounted)	\$ 4,439,000	\$10,754,000	\$ 46,623,000	\$59,020,000	\$48,340,000
DISRUPTION TO COMMUNITY	See Environmental Assessment, Table II-13.				
IMPROVEMENT TO COMMUNITY	New school; Road improvements.	New college; Road improvements; Access to harbor.	New college; Road improvements; Access to harbor.		
DEVELOPMENT OF PORT	Industrial use.	Industry; Marina.	Marina	Industry	Industry; Container port.
BUILDING REUSE POTENTIAL	High	Moderate	Low	Moderate	Low To Moderate
IMPACT OF TRAFFIC ON NEIGHBORHOOD STREETS:					
Without Improvements	At Capacity	Over Capacity	Over Capacity	Not Significant	Not Significant
With Improvements	Under Capacity	Nearing Capacity	At Capacity		
MARKET POTENTIAL	Poor-Fair	Fair	Fair-Good	Fair-Good	Fair-Good

<sup>1/</sup> Costs shown are estimated construction costs for implementation of each plan. They do not include site acquisition or site improvements or holding costs.

<sup>2/</sup> Costs include pier demolition or repair, utilities, access, building demolition.

<sup>3/</sup> Costs include management, maintenance, security and insurance costs. They do not include any tax payments.



Disruption and Improvement to the Community and Development of the Port are additional City Goals which are noted here for comparative purposes. No attempt is made to generalize about Disruption, which is treated fully in Section III under Assessment of Environmental Impacts. Building Reuse Potential is a judgment of the degree to which each scheme will reuse existing structures, thereby minimizing demolition and site preparation.

Impact of Traffic summarizes the effect of the packages on local streets, first without the recommended improvements, then with them.

## IMPLEMENTATION

There are several actions which should be taken next to facilitate redevelopment of the sites and assure successful projects. If the National Park is approved, the development packages proposed for Charlestown will require the recommended short term road improvements, if local streets are to give adequate service. In order to proceed with implementation of those plans, an Environmental Impact Statement on the road improvements is necessary.

Next, the City needs to decide with what kind of plan for each site they wish to proceed. A further investigation of the market and a soliciting of interest from developers will help in making this decision. Further planning will then be needed to produce a developer's kit. Environmental Impact Statements will be necessary at this point in order to obtain licenses from the State for operations on the site, and to obtain federal funds for development costs. Because there will also have to be an EIS for the disposal of the Shipyard out of federal hands, the efforts of preparing these documents should be coordinated.

There are certain risks involved in the City's undertaking of this sort of development. Reuse of existing structures, while it enables quick occupancy and minimal renovation and improvement costs, does not insure a long-lived use. The buildings on both sites are old, and depending on the reuse, may become obsolete and useless in a short time. This means that the City would then again be faced with a redevelopment decision.



However, there is value in the concept of interim use to offset other risks. Packages B and C in Charlestown require large investments by both the City and the private sector. Finding a suitable developer, and successful completion and operation of a project is by no means assured. If Charlestown were to first be reused as an industrial site, then redeveloped partially, as in Package B, further planning could provide new uses for the remainder of the site when that industrial facility is no longer useful.

The administration of the redevelopment of the site is a considerable burden, comparable to an urban renewal project. The decision whether to retain ownership of the land, and thereby ultimate control, or to sell it outright, must be made. Certain marketing activities might best be performed by a disinterested broker, or by a developer of the whole site. Maintenance and supervision of the sites before and during development is a large undertaking in itself.

The responsibilities associated with the redevelopment of urban land are consonant with opportunities presented to shape the future of the City. This study is one step at the beginning of a continuing process of planning and implementation which can upgrade and revitalize the City's resources.



# LAND USE AND ENVIRONMENTAL STUDIES









FOLD-OUT MAP

PLANNING CONTEXT

## SUMMARY PHASE I

The following is a summary of the background material compiled during Phase I of the Study. It is included here to establish the general planning context in which the Boston Naval Shipyard will be developed. The numbers and letters in the margin of the text refer to the map at left.

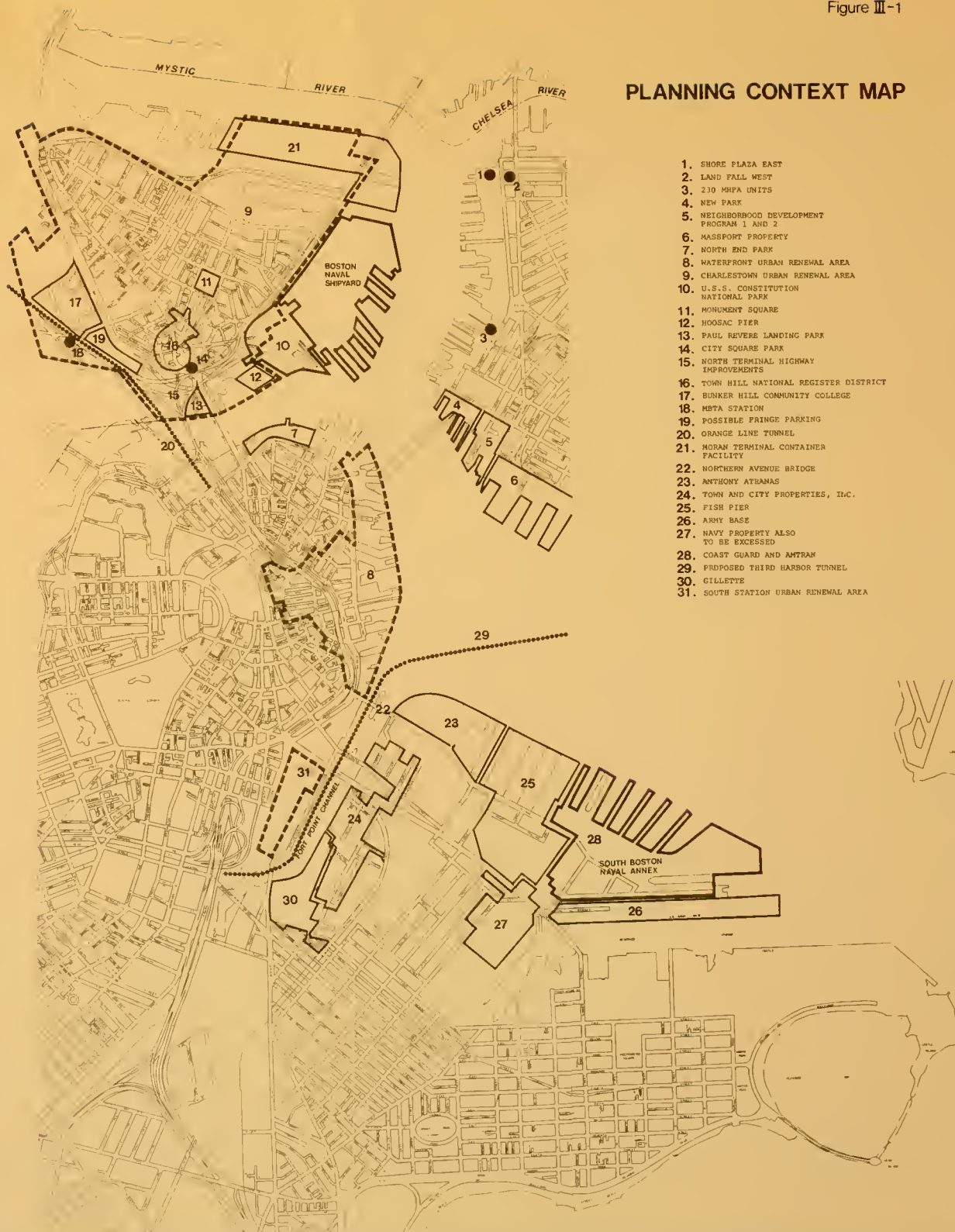
### BOSTON HARBOR PLANNING CONTEXT

There is a significant amount of development taking place along the water's edge in Boston Harbor which affects the market demand for waterfront sites and has planning implications for maintaining a variety of waterfront uses.

East Boston. In East Boston, there are 1,500 dwelling units planned or under construction. These include:

- 1 The Shore Plaza East project, currently under construction, has 380 housing units financed under HUD's 236 program.
- 2 Across Border Street, a 236 elderly housing project, Land Fall West will have 59 dwelling units.
- 3 Further South on Border Street, there will be 230 MHFA units. There will also be a new elementary school, the Barnes School, on the waterfront.
- 4 Across from downtown, there will be a new park adjacent to the Neighborhood Development Program 1 and 2 areas.
- 5 Over a two to three year period, there will be 400 units of mixed income housing, 280 units of elderly housing, mixed with 40 market units and 20 low income family units developed on the two sites.
- 6 Mass Port owns 53 acres in East Boston, the future use of which has not been decided. There has been speculation that if the City acquires the South Boston Annex of the Shipyard, there might be an acre-for-acre land trade. There has also been some indication that Mass Port is interested in locating a new container facility in East Boston. The residents, however, have expressed a strong desire to develop the land as public open space.
- 7 North End. North End Park, jointly managed by the City and the M.D.C. is being expanded by five acres.  
There is a proposal to convert the 450-room Hotel Madison to 325 elderly units for the BHA.

## PLANNING CONTEXT MAP



## SUMMARY PHASE I

The following is a summary of the background material compiled during Phase I of the Study. It is included here to establish the general planning context in which the Boston Naval Shipyard will be developed. The numbers and letters in the margin of the text refer to the map at left.

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- 7 North End. North End Park, jointly managed by the City and the M.D.C. is being expanded by five acres.  
There is a proposal to convert the 450-room Hotel Madison to 325 elderly units for the BHA.



If the Coast Guard moves off its 4½-acre site in the North End, the BRA would like to see housing, or possibly some community facilities there.

- 8 Urban Renewal Area. The BRA projects that there will eventually be 2,000 new and renovated dwelling units produced in the waterfront urban renewal area; some of the projects are as yet unidentified. These units are mostly in the luxury rental category, except a few hundred units of elderly - low income housing.

With the housing is often located specialty shopping, and office space, especially on the wharves. Restaurants are also locating in these areas. On Parcel A-7, there will be a 400-room hotel. In addition, there will be shops, office and restaurant space in the renovated Quincy market buildings.

These uses of housing, restaurant and specialty retail and office in the urban renewal area are located close to downtown and directly on the waterfront, both very positive factors in the success of such projects. Together with the housing being developed in East Boston, 3,500 new dwelling units are projected for the next five years. In addition, there is park land, office space, retail shopping, restaurants and a hotel projected for the waterfront.

#### CHARLESTOWN PHYSICAL CHARACTERISTICS

- 9 Charlestown Urban Renewal Plan  
The Charlestown Urban Renewal Plan was accepted by HUD in 1965 and most of its active projects are complete: a developer has been selected for the Austin Street shopping center, a new firehouse has been built, and over 500 new housing units have been constructed. Several parcels are committed to housing and mixed commercial/housing uses and await circumstances beyond BRA control (mortgages, MBTA elevated demolition) for development to proceed. A number of parcels along Chelsea Street, near City Square, are under development pressure, but uncertainty about future road alignments keeps them vacant.

- 10 U.S.S. Constitution National Park  
A bill is pending before the U.S. Congress which would make the southwest section (23 acres) of the Shipyard into a National Park





Figure III-2  
Aerial view of Boston Naval  
Shipyard, Charlestown site.

centered on the U.S.S. Constitution. The Park would be part of a scattered site National Historic Park with other sites in downtown Boston and at Bunker Hill.

- II The Park is expected to generate as many as 1,500,000 visitors per year when it is completed in 1978; approximately 700,000 people now visit the U.S.S. Constitution each year. Park plans do not call for on-site visitor parking, although bus unloading areas will be provided.

There will be no admission charge to the park. Limited picnic facilities will be provided, but this will not serve as a neighborhood recreation area. The average stay of a visitor will be one-half to two or three hours, partly depending on whether there are restaurants or not. Hearings in Congress on the

National Park proposal for the Boston Naval Shipyard began in June. It is up to them to decide whether to enlarge the park area to include the Ropewalk, Telephone Exchange, the Hemp Storage and Tar Buildings. After approval of the park, a master plan will be prepared.

Access - The Park Service will retain control over access through Gate 4, although they will be willing to allow access for non-park vehicles to compatible uses, such as parking, restaurants and so on. They do not plan to widen the gate, therefore access for large vehicles will remain difficult.

The Park Service has indicated willingness to allow interim access to the rest of the site through Gate 1. The details will be negotiated with the City. Emergency access through the park can probably be obtained.

A number of buildings of historic significance which are not within Park boundaries have been identified by the Park Service, and there is an ongoing consideration of the merits of various structures. The approach they will take in determining which ones will have permanent restrictions on facade changes (facade easements) will be to negotiate on the basis of a plan proposed to them by parties proposing to acquire the site or individual buildings.

- 12 Hoosac Pier. Mass Port plans to develop the area between the railroad tracks and Water Street in front of (to the west) the Hoosac Pier warehouse building for commercial recreation use. These plans include a new building to house a diorama of the revolutionary battle at Breed's Hill. Parking for this activity (approximately 100 spaces) would be provided. There also has been discussion of a fast food restaurant. In addition, Mass Port is purchasing a Dutch Water Bus which would follow the BRA proposed harbor water route, which includes one stop just south of the U.S.S. Constitution berth.

The owners of Grand Rapids Warehouse located immediately north of the City Square end of the Charlestown Bridge, have a consultant investigating park-related uses for that site.

- 13 Paul Revere Landing Park  
On the Charlestown side, the new Warren Avenue Dam and Locks will terminate in a small triangular parcel bounded by the Charlestown Bridge and the Tobin-Central

Artery connectors overhead. The MDC is planning to use this land (less than 1 acre) as a park to commemorate Paul Revere's landing on April 18, 1775 to begin his famous ride.

#### **14** City Square Park

Proposed improvements to smooth the flow of traffic in City Square, relocate the present park to the area in front of the Court House. Plans are still being developed by the City of Boston and Mass DPW. They affect an area that includes Joiner Street, Water Street, and up to Bunker Hill Community College.

The existing pedestrian underpass beneath the Tobin Bridge approaches will have to be improved as a pedestrian link between the new National Historic Park and Bunker Hill, Winthrop Square, and other places of historic interest in residential areas of Charlestown. A safe, pleasant continuation of the Freedom Trail from the North End is also desirable.

#### **15** North Terminal Highway Improvements

The North Terminal study began as an effort to design facilities to meet the demands of projected 1990 traffic volumes. In response to public and administrative pressures, the five alternatives under evaluation in current draft EIS offer only operational improvements to the existing expressway and arterial network. The problems to which these improvements are addressed include:

- 1) Weave of Leverett-Tobin and I-93 - Central Artery traffic occurring on 750' section of Fitzgerald Expressway Bridge across Charles River.
- 2) City Square, Keany Square, Leverett Circle traffic congestion.
- 3) Reverse curve and hazardous access ramps on approaches to Tobin Bridge, near Water/Chelsea Streets.

The five alternatives being evaluated are:

- Alt. A (No build): City Square improvements only.
- Alt. B (Min. build): Crossing Charles River by relocated Rutherford Avenue.



Alt. C (High Level Crossing): 1962 scheme directly connecting Tobin Bridge and Leverett Circle. Proposed by M.D.C., Massport; dropped by M.D.C. and Mass Department of Public Works.

Alt. D (Parallel Crossing): Designed by the BRA; new double deck via duct across the Charles River.

Alt. E<sub>2</sub> (Warren Avenue Crossing): Designed for M.D.C.; new viaducts across new Warren Avenue dam.

No construction of any of these alternatives would be undertaken until after the end of the Bicentennial celebration in 1977.

Draft EIS findings suggest that the alternatives cannot really be distinguished on the basis of environmental impacts. Ecological impacts are relatively insignificant chiefly because North Terminal is already heavily urbanized. The acreage exposed to noise levels of 70 L<sub>10</sub> dba or more is not significantly different among the five schemes, although Alternate C exposes a new corridor. 1980 air pollution levels would be reduced somewhat under Alternates C, D, and E from levels with Alternates A and B.

## **16** Town Hill Historic District

The district (see map) was placed on the National Register of Historic Places in May 1973. As such, it is subject to both Section 4f and Section 106 reviews if any transportation project involving federal funds crosses its boundaries. It includes many 19th century houses, some 18th century buildings and the John Harvard Mall.

## Bunker Hill Community College Area

**17** Community College. Bunker Hill Community College opened its doors in 1973. While it is intended primarily as a commuter facility and students are encouraged to use rapid transit and buses, parking facilities are included in the plans.

**18** MBTA Service. The MBTA plans to open the new Orange Line station at the Community College sometime in late 1974. Rapid transit service will then extend to Oak Grove, Malden and plans call for eventually serving Reading.

There will also be a bus station with lines running to Cambridge and Somerville via Prison Point Bridge (reconstruction to be completed in 1974), downtown Boston via City Square and Charlestown Bridge, and a possible Charlestown Loop service. The existing bus line to Chelsea via the Tobin Bridge will probably be rerouted through Sullivan Square.

- 19 Fringe Parking. Charlestown Urban Renewal Plan parcel P-15B is under consideration for a number of parking uses. Present plans call for making the area into at-grade parking (about 800 cars) for Community College occupants. The possibility of using the parcels for a 7 level, 3,000 car fringe parking garage with connecting ramps to I-93 is about to be studied by Mass Department of Public Works. Charlestown residents are at present opposed to the garage while Back Bay and Beacon Hill residents favor it.

- 20 Orange Line Elevated. The Orange Line elevated structure runs across the Charlestown Bridge, through City Square and up Main Street to Sullivan Square, and beyond. The City Square and Thompson Square stations on this line will be closed once the new elevated line via Community College is opened in late 1974. However, the existing viaduct cannot be taken down until the new MBTA repair shops at Wellington Circle are completed; the viaduct is the only connection to the present MBTA shops in Everett.

Access to and from the rapid transit and buses at City Square is hazardous because of the traffic congestion surrounding the access stairs and bus platforms.

- 21 Moran Terminal Container Facility. Massport plans to enlarge the 22-acre Moran Terminal Container Facility by 10-20 acres. As no additional crane capacity and only some additional storage is anticipated, the new space will be mostly for yard use. The railroad is not used by the container facility; however, the Mystic Pier has some rail requirements. The estimated daily truck traffic in and out is approximately 300 each way.



# CHARLESTOWN SITE

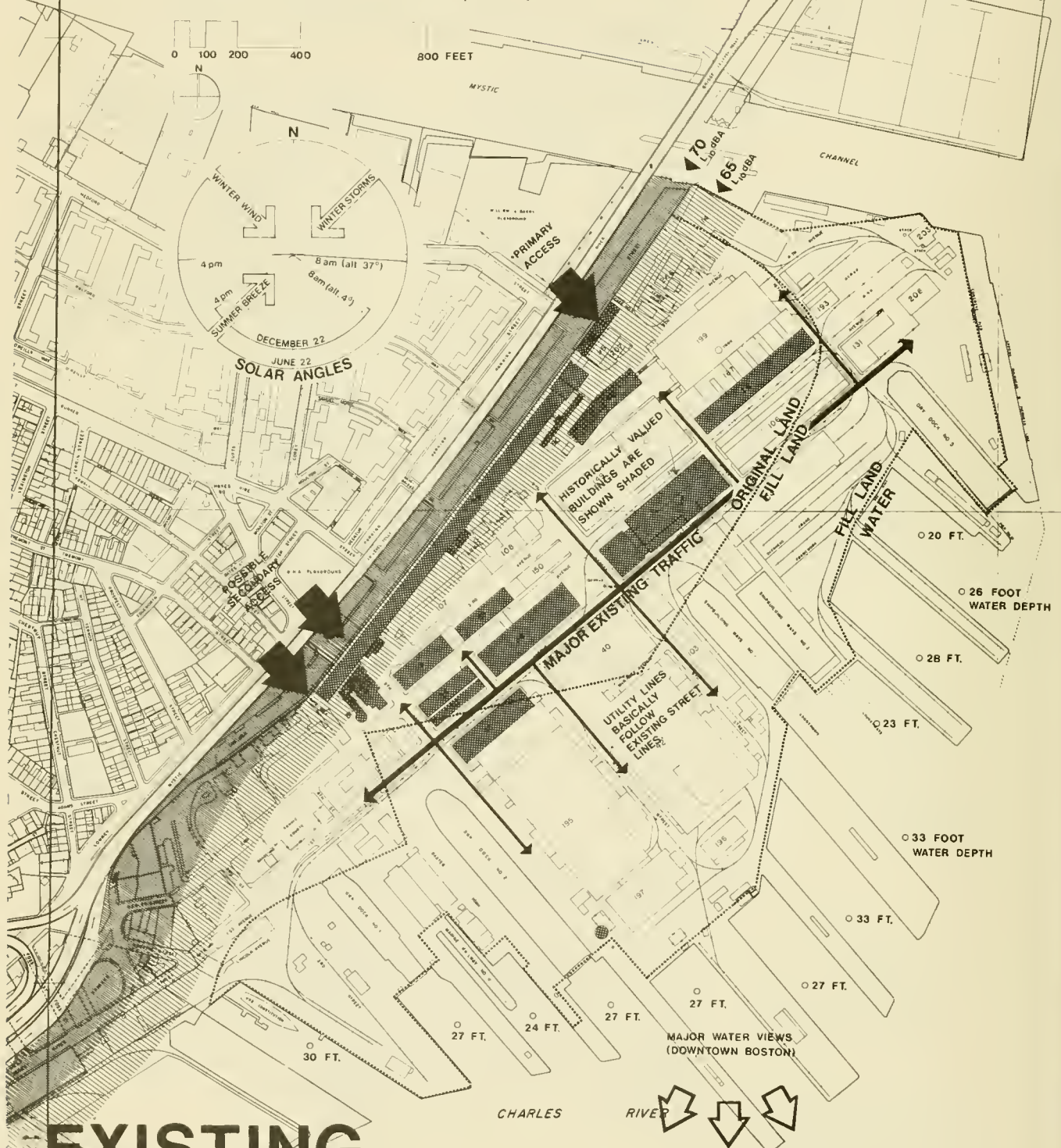
## LAND USE AND TRANSPORTATION STUDY FOR THE BOSTON NAVAL SHIPYARD

BOSTON ECONOMIC DEVELOPMENT AND INDUSTRIAL  
COMMISSION

BOSTON REDEVELOPMENT AUTHORITY

WALLACE, FLOYD, ELLENZWEIG INC. ARCHITECTS/PLANNERS

Figure III-3



# EXISTING SITE CONDITIONS

## SITE CONDITIONS

The Charlestown Site Conditions map shows diagrammatically the most important physical characteristics which operate as influences on development. The map shows site access, chief circulation paths on the site, berth depth, extent of filled land and aesthetic influences such as the dominant Tobin Bridge structure, highway noise and views. It also identifies buildings of historic value, important utility corridors and pier condition.

Some general conclusions can be made from these diagrams: Housing or hotel use within the 65 to 70 L 10dBA zone is inadvisable because of higher construction costs to provide a suitable acoustical environment; foundation costs for new structures will be higher on filled land because piles will probably be necessary. The street and utility infrastructure (along First Avenue, portions of Second Avenue and Sixth, Seventh, Eighth, Ninth and Fifteenth Streets) is significant and should be preserved in order to reduce future development costs; and piers 8, 9 and 10 should be removed according to the engineer's report (June 26, 1974).

## SITE ZONES

Utilizing the Site Conditions and Building Characteristic maps, (the latter not included here), an analysis of the site was made to identify zones of similar site characteristics to be used as the physical basis for working out the tentative development packages.

The proposed National Historic Park site is characterized by small scale historically valued buildings of relatively low density interspersed with open land.

Zone 1 is adjacent to the proposed National Park and consists principally of the historically valued buildings; all are relatively small scale with the exception of the Power Plant. Its use is tied closely to large scale industrial facilities in zones 2, 3, 4 and 7. The size and shape of and the historic restrictions on these buildings make them most suitable for commercial/recreational uses such as boutiques, restaurants, inns, museums, and offices. The zone is remote from the water's edge, but the early 19th century character could provide an opportunity to develop land and building uses of interest to tourist and leisure activities.

Zones 2, 4 and 5 are all directly related to



# CHARLESTOWN SITE

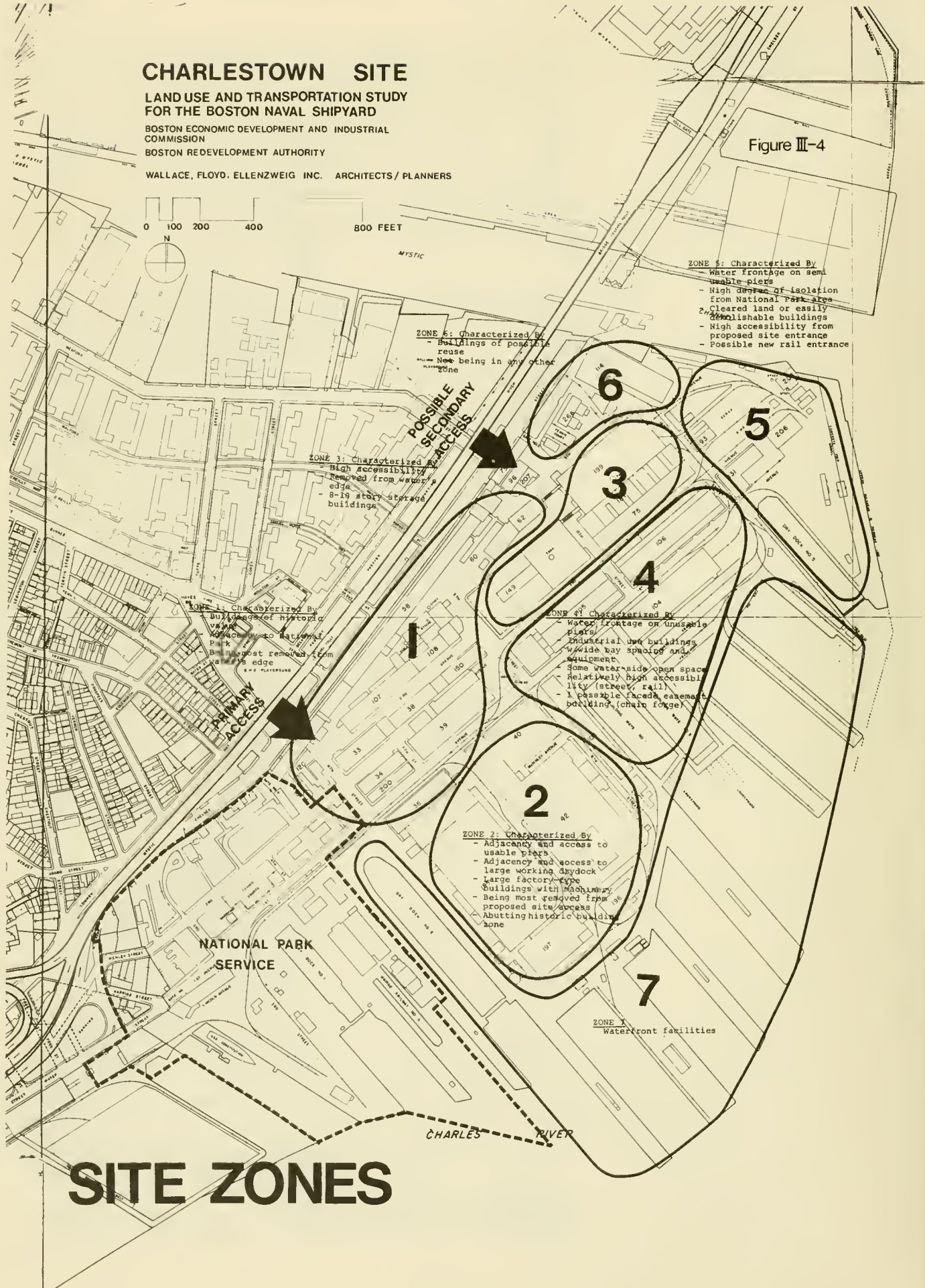
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Figure III-4



# SITE ZONES

the water. Zone 2 is adjacent to the National Park site, dry dock 2, and to four usable piers. It contains large machine and electronics shop buildings with high, large span spaces. This zone is most removed from assumed primary site access.

Zone 4 abutts wooden piers that are in a deteriorating condition. The buildings here are also large scale, heavy industrial buildings with wide bay spacing and with interior cranes. There is some water side open land and good street and rail accessibility.

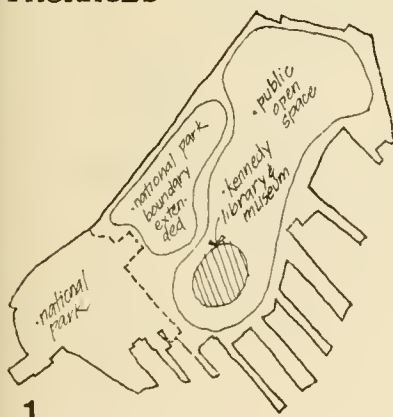
Zone 5 is comparatively open. The buildings remaining are small and could be demolished and the site easily cleared. This zone is the most remote from the National Park and is easily accessible to Gate 5.

Zone 3 consists of a service area containing two large warehouses both in good condition. The zone is highly accessible to Gate 5.

Zone 6 consists of isolated residential and woodworking shop buildings.

Zone 7 includes marine related facilities: Dry Docks 2 and 5; and Piers 3, 4, 5, 6, 7, 8, 9, 10, and 11.

## ALTERNATIVE LAND USE PACKAGES



### 1. Public Open Space, Kennedy Library:

Expanded National Park: 13 additional acres to include Ropewalk and most historic buildings.

Public Open Space: 30 acres.

Kennedy Library and Museum: 10 acres.

### 2. Shipbuilding:

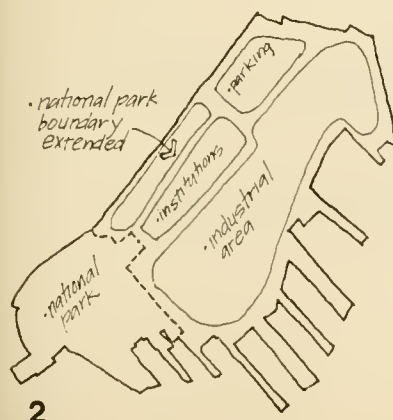
Industry: 40 acres, shipbuilding, ship design.

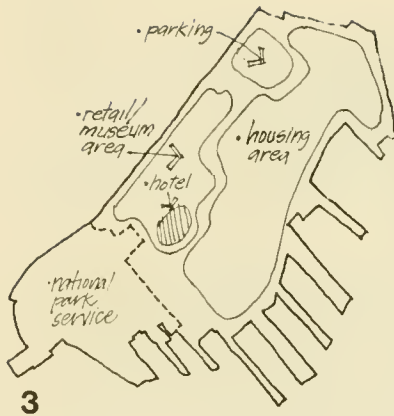
School: School of Commerce, Trade Schools administered by the City of Boston.

Museum: Historic Naval theme.

### 2A. Industrial:

Substitute retail/restaurant for museum.





Substitute hotel for ship design.

Substitute industry for shipbuilding.

3. Residential:

Residential: 28 acres, 1,400 d.u.s

Hotel: Rehabilitated, 400 rooms.

Commercial/restaurant

Museum

3A. Same as above and School: School of Commerce, Trade Schools administered by the City of Boston.

3B. Substitute residential for museum and hotel (shown in 3.).

4. Theme Park:

Theme park facility: Family entertainment, rides, exhibits.

Hotel: 400 rooms

Retail/restaurant

Museum

4A. School: School of Commerce, Trade Schools administered by the City of Boston, in Building 149.

5. Industry and Convention:

Convention Center: 300,000 square feet.

Hotel: Renovation, 400 rooms.

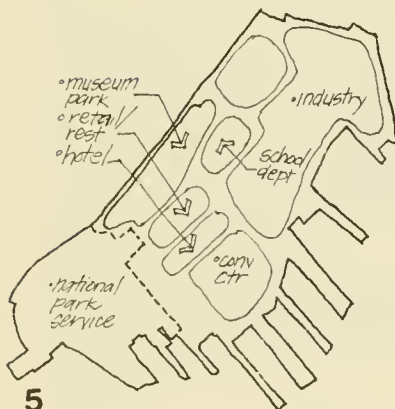
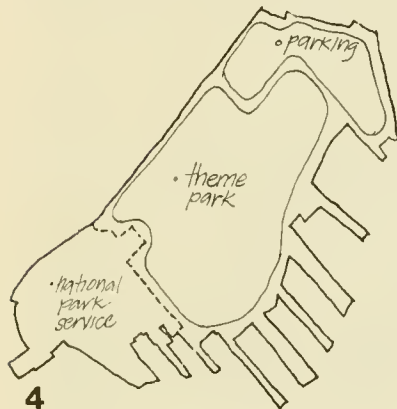
Museum

Industry: 25 acres

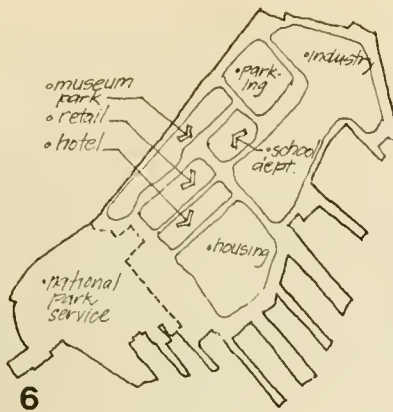
Retail/restaurant

School: School of Commerce, Trade Schools administered by the City of Boston.

5A. Build new hotel, add office building.







## 6. Industry and Residential:

Industry: 25 acres

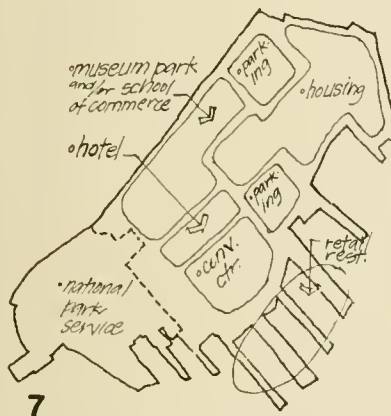
Residential: 10 acres, 500 units

Retail/restaurant

Museum

School: School of Commerce, Trade Schools administered by the City of Boston.

Hotel: 400 rooms



## 7. Residential and Convention:

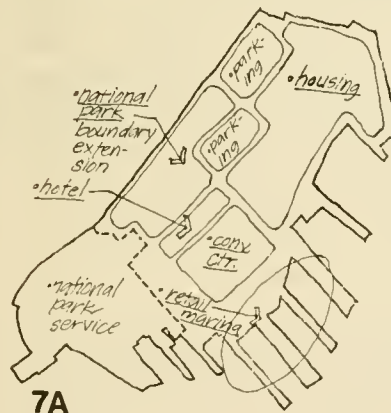
Residential: 15 acres, 750 d.u.s.

Convention: 400,000 square feet

Museum

School: School of Commerce, Trade Schools administered by the City of Boston

Office



## 7A. Convention, Expanded National Park, Housing:

Convention Center: 350,000 square feet

Hotel: 400 rooms

Retail/restaurant

Marina

Expanded Park

Housing: 18 acres, 900 d.u.s.

7B. Same uses as 7., different arrangement.

## SOUTH BOSTON PHYSICAL CHARACTERISTICS

The residential community in South Boston is over one-half mile from the Naval Annex site; all of the land directly surrounding the site, including the Annex, is currently in industrial, warehouse, office, or commercial-restaurant use. These uses directly affect the neighborhood by causing truck traffic on local streets. Because of strong community feelings, any increased use of the site will need to provide access which does not use Broadway and First and Second Streets. In addition, the edge between residential uses and the industrial area is not well defined, resulting in mixed uses, leading to conflicts and incompatibility. It is not anticipated that reuse of the Annex will contribute to the solution to this problem.

The following is a summary of current development proposals for South Boston, by state and city public agencies and by private groups.

- 22 Northern Avenue Bridge. A new Northern Avenue Bridge is currently planned immediately adjacent to the existing span. This improvement is further discussed in Section IV, Transportation.
- 23 Anthony Athanas. On the piece of land fronting on Fort Point Channel and the Inner Harbor, including Piers 1, 2, and 3, Anthony Athanas plans a luxury housing, hotel and office complex. There will be 1,000 units of housing in high rise towers, a 600-room hotel, 500,000 square feet of office space in five low-rise buildings, local shops, and a restaurant. There will be a marina and health club to serve the residents. This development will connect to the existing Anthony's Pier 4 Restaurant.
- 24 Town and City Properties, Inc. Along Fort Point Channel, Town and City Properties, Inc. is planning a combination of rehabilitation and new construction to provide warehouse and office space and housing with some local retail establishments. There will be 3.5 million square feet of space, about 40 per cent office and 60 per cent warehouse and 1,600 dwelling units. This space will be occupied by people displaced by South Station and Federal Reserve Bank projects, and new business that finds it a desirable location. This development is dependent on the develop-



Figure III-5

Aerial view of South Boston Naval Annex.

ment of a new Transportation Center in South Station.

- 25 Fish Pier. Mass Port is currently planning to add to the present use some combination of fishing industry facilities, cruise terminal, hotel, world trade center, and a retail complex. There is the possibility of an additional hotel and parking garage on the land directly across Northern Avenue.
- 25 Northern Avenue. Mass Port also owns the former rail yards south of the Fish Pier and Northern Avenue. There has been discussion of locating a convention center on this site. Mass Port claims to own Northern Avenue and would like to close it to all traffic. The city will attempt to retain a right-of-way to permit access to the Naval Annex.
- 26 Army Base. Along the Reserve Channel is the former Boston Army Base, presently being administered by the Boston Naval Shipyard. As few Shipyard functions take place in the



Army Base, the Navy has been in the process of excessing it for several years and will probably do so in 1974. The principle structure, 666 Summer Street, contains approximately 1.5 million square feet and is used as offices to house a regional defense supply agency, as warehousing, as minor industrial shops, and the former Boston Induction Center.

- 27 Other Navy Property. Additional properties are to be declared excess by the Navy. The Fargo Building at 495 Summer Street has been used for office and storage space including the Naval Reserve Center and the Office of Naval Research. The adjacent recreation facilities include baseball diamonds, running track, and a support building. Together with smaller adjacent parcels a total of 27.1 acres is proposed to be reported to GSA as excess by the Navy. The actual disposition to GSA will come after the action has been approved by the Armed Services Committee.
- 28 Coast Guard and Am Trak. Several federal agencies have expressed an interest to GSA in acquiring parts of the Annex. The U. S. Coast Guard would like 28 acres of land and piers on the westerly end to relocate all its Boston operations, which are now scattered on different sites. Am Trak has expressed interest in two buildings and close to 30 acres of land to relocate its engine repair facilities which are now in Rhode Island.
- 29 Third Harbor Tunnel. The Third Harbor Tunnel as proposed and endorsed by the Governor, would be a two-lane special purpose facility to serve trucks, buses and limosines connecting the Central Artery and the South Station transportation center to Logan Airport. The proposed alignment begins at the Turnpike Interchange and goes underground along the west side of Fort Point Channel and surfaces on airport property.
- 30 Gillette. One of the large land holders in South Boston, and the city's largest industrial employer is Gillette. They are located near Fort Point Channel, and are interested in building an office building for their corporate headquarters.

#### SITE CONDITIONS

The site condition map shows the existing situation on the site. Two piers are usable;

# SOUTH BOSTON ANNEX

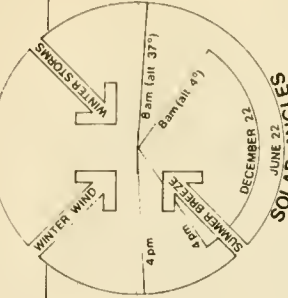
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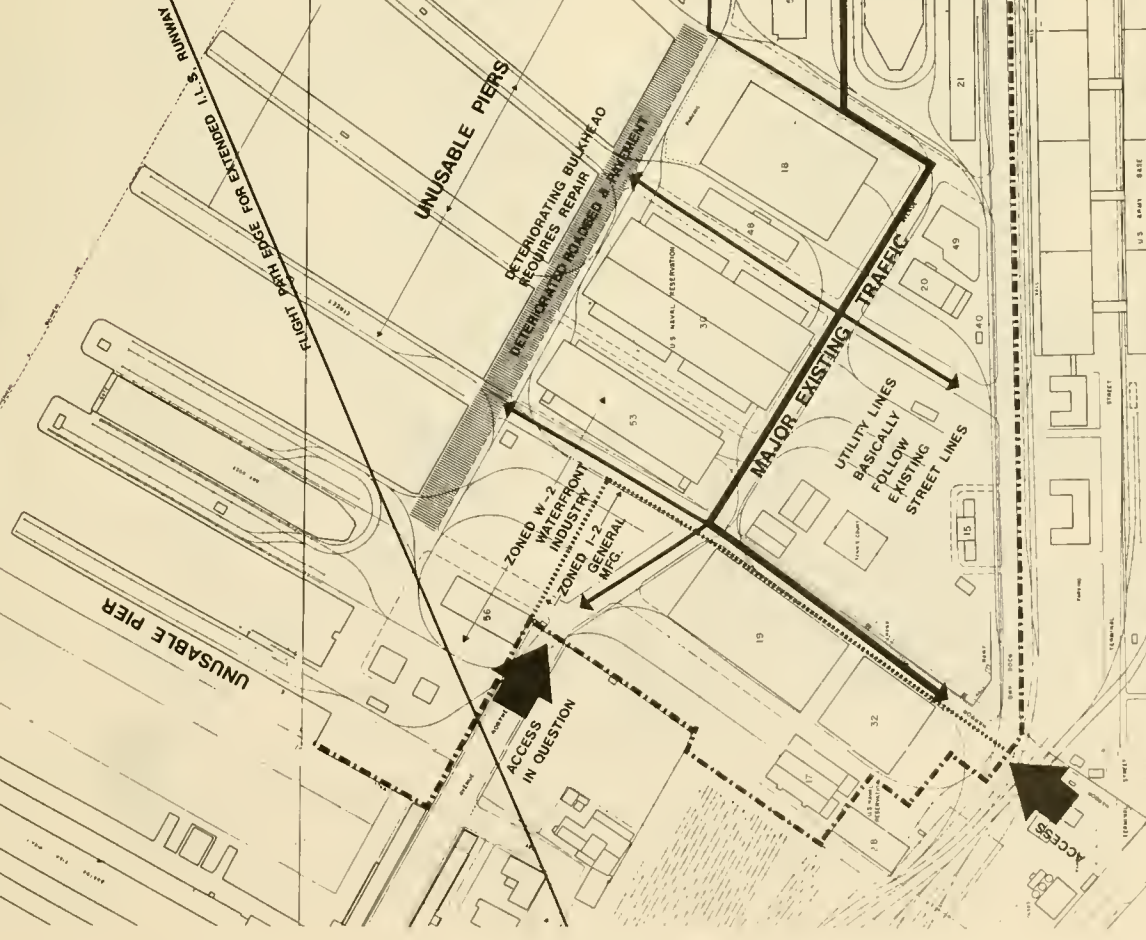
HEIGHT LIMIT  
150 FT. (169 MSL)  
HORIZONTAL SURFACE  
OVER ENTIRE SITE.



FLIGHT PATH EDGE FOR RUNWAY 4L

Figure III-6

# EXISTING SITE CONDITIONS



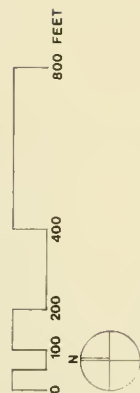


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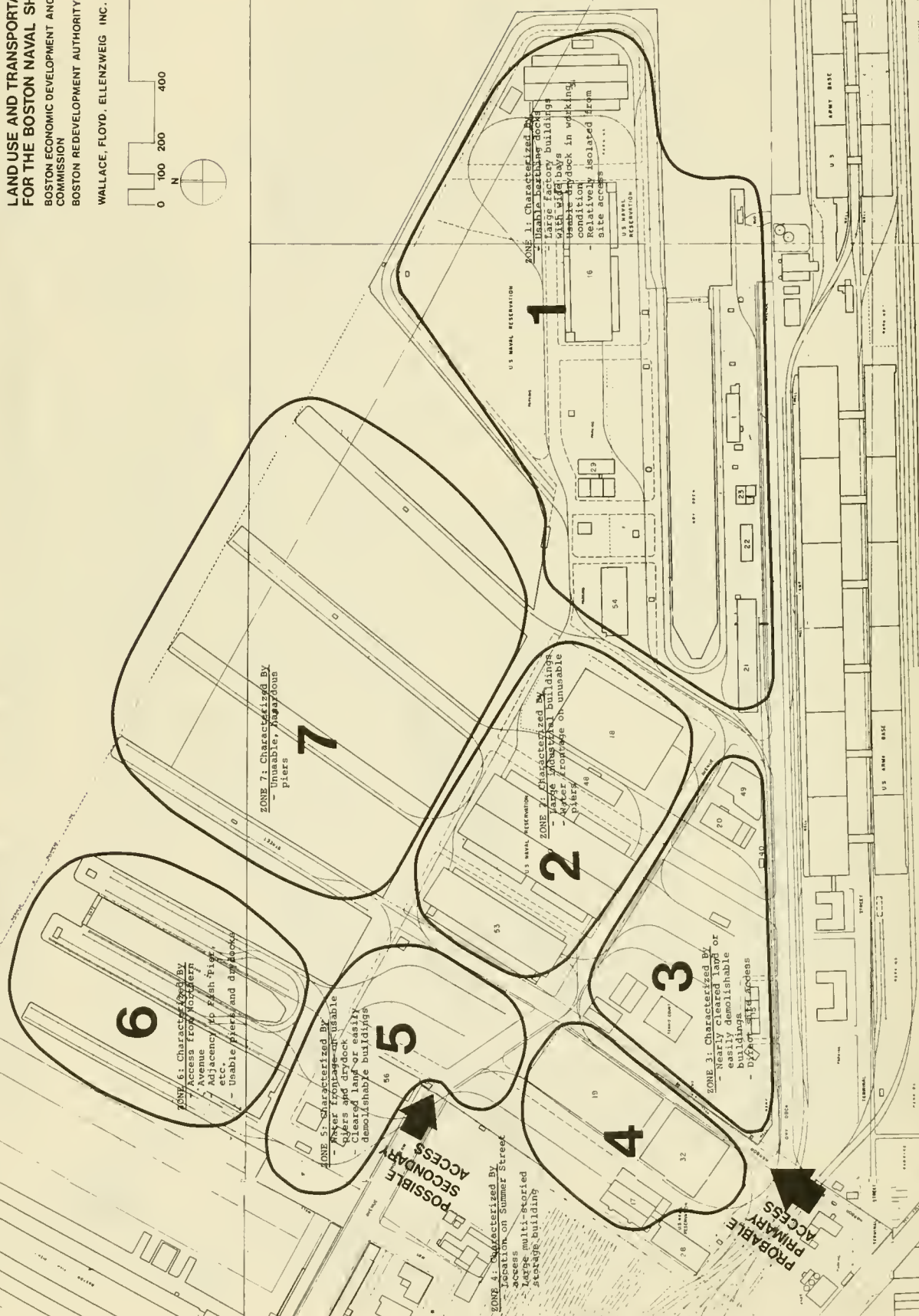
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# SITE ZONES



the remaining four are not, and should be removed or repaired. There is a very large drydock in operating condition. The major utility lines follow the street pattern. The City zoning boundaries are shown.

The height limitation on the entire site is 150 feet because of the proximity of Logan Airport. The edges of the flight paths for the runways with the most impact on the site are shown. The noise from the aircraft is rated 30-40 NEF, a level which is judged to be unsuitable for housing, hotels and uses which require quiet, such as concert and assembly halls.

One conclusion to be drawn from these conditions is that the site is not suitable for housing. Not only is it noisy, but it is far from any other residential uses, being mostly surrounded by industry which is incompatible with residential use.

Channel depth in the harbor is rated at 40 feet. The site is two miles from open water giving it excellent water access. There is also rail access directly into two of the buildings.

## SITE ZONES

Zone 1 is characterized by usable berthing docks and a very large drydock. The buildings in the zone are large factory buildings with wide bays. This land is furthest from either point of access to the site.

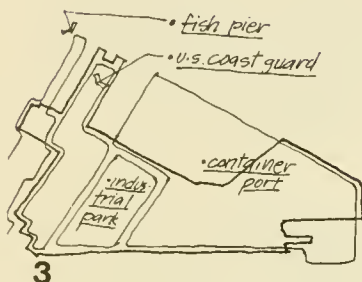
Zone 2 also has large factory buildings and is located on the waterfront, although the piers are not usable. Zone 3 is adjacent to what will probably be the main point of access for the site. The land is nearly clear, or has only easily demolished buildings located on it.

Zone 4 is also located at the main point of access and has large multi-story storage buildings. Zone 5 is adjacent to the water and the usable piers. Its buildings can be easily demolished - it is essentially clear land.

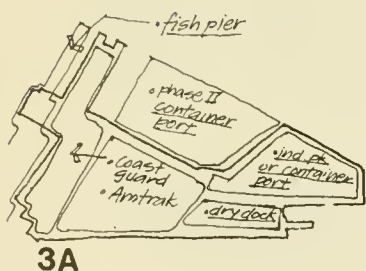
Zone 6 is the usable piers and Zone 7 contains all the unusable piers.

## ALTERNATIVE LAND USE PACKAGES

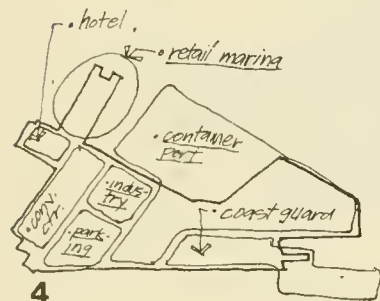
1. Shipbuilding - all shipbuilding.
2. Industrial - all industry.
3. Mixed Industrial - container port, industrial park, U. S. Coast Guard, Fish Pier.
- 3A. Mixed Industrial - container port, Bethlehem, AmTrak, U. S. Coast Guard, Fish Pier.
4. Mixed Uses - container port, U. S. Coast Guard, Industrial, Convention, Hotel, Retail/Restaurant, Marina.



## PHASE I DECISIONS



Following the presentation of the development packages formulated in Phase I, five development packages were selected for further detailing in Phase II. For the Charlestown site Packages 2 (Industrial), 6 (Industrial and Residential), and 7A (Residential/Convention) were chosen. For the purpose of Phase II analysis they have been designated A (Industrial/Institutional), B (Housing/Industrial/Institutional), and C (Hotel/Convention/Housing/Institutional), respectively. The land uses in each of these packages have not changed, but there has been development and modification of the sizes and program requirements of some of the uses to reflect new information on market and physical considerations.



For the South Boston site, Package 2 (Industrial) was chosen for further detailing. In addition, a mixed industrial plan including a container facility, dry dock ship repair



operations and general industry was developed. These packages are designated A (Industrial Park) and B (Container Port/Industrial Park). The City also requested that a transportation analysis be prepared for a shipbuilding alternative on the South Boston site.

## DEVELOPMENT PACKAGES INTRODUCTION

Described in this section are land use proposals for the reuse of both sites of the Shipyard. The proposals are part of development packages, which include compatible and reinforcing land uses, transportation recommendations and market analysis. The types of land uses and the amount of land devoted to each use is shown. (See diagrammatic plan in Section II, Summary) The reuse of the space or the demolition of each existing building is detailed, and square foot figures for new construction are projected by use.

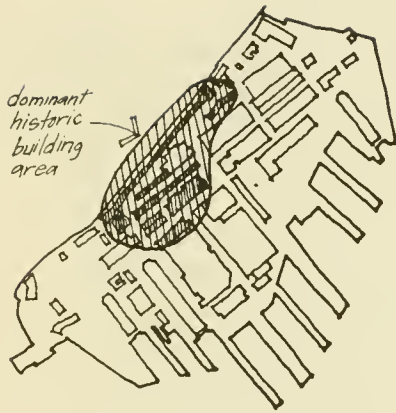
The development packages are intended as basic input into the decision of what kinds of uses should be located on the Shipyard sites, rather than as a developer's kit ready for the design stage. The relationship of the use areas to each other, to the existing and proposed surroundings, and their need for services and public improvements are discussed, but there are no detailed site plans. This very preliminary planning demonstrates the scale and type of development appropriate to the site, and indicates the extent of the City's involvement required in the various packages.

A range of scale of development and investment is illustrated in the three Charlestown packages. In Charlestown, the amount of change in kinds of use is minimal in Package A, moderate in B and extensive in C. Likewise, the amount of demolition ranges from small in A to highest in C. Inversely the amount of developer investment is smallest in A and largest in C. Time involved in implementation follows the same pattern - shortest in Package A and longest in C.

In South Boston, this sort of range is not possible because site conditions dictate that industry is the only appropriate use. Alternative approaches to industrial use are shown, however: private development regulated by the City, or private development coupled with a public container facility.



Accompanying the diagrammatic plan for each package in Section II are two charts which summarize the land use programming for the package and detail the disposition of each building. The program assumptions are derived from Phase I and from architectural and marketing experience. New construction of industrial buildings has been estimated at 30 percent of the area of land available for such development.



The arrangement of the land uses on the Charlestown site are based on attributes of different parts of the Shipyard as noted in Site Conditions above. In each package the use proposed for the area where most historic buildings are located remains constant. Because of the historic value of these structures and the restrictions on them because of their appearance on the National Register of Historic Places, appropriate reuses are very limited. The scale of the buildings, their character, texture and relation to one another strongly suggest institutional uses, such as a school, college, or museums, or small scale commercial enterprises. Because of the proximity to the proposed National Park and the historical continuity between two physical areas, it is appropriate to provide services to accommodate tourists visiting the Park in the historic area outside the Park. All Charlestown packages assume and depend upon the existence of the National Park.

This historic area which is common to all the packages has some variation in use within it, but any of the combinations shown would be compatible with any of the proposals for the remainder of the site. The uses for this remaining portion of the site are arranged in accordance with a circulation plan and an open space system particular to each package. The uses are flexible and in any one package, given the historic area and the circulation and open space, uses for the rest of the site can vary.

Also common to all the packages is the use of Gate 5 as the main entrance. Since there will be no public automobile access to the National Park, there is the opportunity to provide needed parking and access through Gate 5 and the historic area. Trolleys, jitneys, minibuses, or other conveyances could

be used to transport people.

Pedestrian connections to other areas of historic interest in Charlestown will also be important in relieving congestion and in making visiting the attractions easier for the tourist. Location studies for a link connecting the Park to Bunker Hill were not conducted, however, the path shown on the plan for each package seems a logical route. The BHA playground should be developed as a public park. Ways of crossing traffic should be designed into the new road patterns.

In both Charlestown and South Boston, the public will be asked to make a substantial investment to implement these proposals. Public improvements will include open space, paving and lighting of pedestrian and vehicular streets on the site, the access improvements off the site, and the administration of the development. Costs of improvements to the utility system will be negotiated between the City and the developer. The City may also have to bear the costs of demolition. An explanation of the costing method appears in the Appendix. Section V explains the staging which has been projected for the benefit/cost analysis.

#### ASSESSMENT OF ENVIRONMENTAL IMPACT

The following impact categories have been used to make a preliminary assessment of the probable effects of the proposed development packages on their environment. While this is not intended to substitute for Environmental Impact Statements which may be required for disposition or development of the sites, the assessment categories are basically those used in an EIS. The categories and the existing conditions are described below; the assessment of probable impact for each development package appears in the package description.

#### PUBLIC FACILITIES AND SERVICES

(1) Fire Protection. Charlestown has two fire stations, one in Winthrop Square and one near Sullivan Square. In addition, the Fire Department has temporarily taken over the Navy's fire station and will eventually move its Winthrop Square equipment to Building 200. The Fire Chief feels the equipment in Charlestown is adequate to serve new develop-

ment, but detailed study should be performed when development plans are firm.

In South Boston there is a deactivated fire station on the site. Currently the site is protected from the South Boston fire station at J and Fourth Streets.

(2) Police Protection. On both sites new streets will be dedicated to the City and added police protection will therefore be required. The cost of this new service has been estimated in Section V.

(3) Schools. Charlestown's schools currently have excess capacity and no redevelopment package will exceed it. No impact on South Boston school enrollment is expected.

(4) Solid Waste. The Navy provided its own solid waste disposal; there will be an increase in demand on the City's services by any new use which does not contract privately for disposal. There will also be an impact on the dumping areas, incinerators, and any other method of disposal used. Proposed commercial uses, especially the hotel and restaurant need daily pickup, which probably will be privately contracted. Industrial waste disposal is also probably privately contracted.

(5) Water Supply. The City provided the Navy with water and will continue to supply new uses on the site. Further study is needed to determine the adequacy of existing system for new use demands.

(6) Open Space and Recreation. The local facilities in Charlestown near the site are limited to the BHA playground, which is in unusable condition, the Barry Playground, and the play area associated with the new Kent School. The National Historic Park is not expected to include facilities to meet local need. Charlestown residents have little access to the waterfront for recreation; new development can provide increased public access. Neighborhood open space and recreation in South Boston is not located near the Annex. The Navy's recreation area is in the process of being declared excess and would be reused by the community and workers on the site.

(7) Health, Day Care, Library. No survey has been made to identify community facilities of this type, but there should be concern that any new housing development adds to the demand for this type of service rather than overburden existing facilities.

#### COMMUNITY RESOURCES

(1) Shopping, Churches, Family Service Centers. Any new residential development of any size should include convenient shopping and recreation and meeting facilities so as not to overload the existing community resources. The new community shopping center in Charlestown located near Thompson Square would be expected to serve new housing constructed within the Shipyard.

(2) Resources Provided by New Uses. New development can provide additional resources such as schools, colleges, convenience shopping and waterfront recreation, which provide the community residents with new services and opportunities.

#### DEMOGRAPHIC CHANGES

(1) Impact On Housing Market. Charlestown and South Boston both have very low rent structures. Increases in activities which cause people to wish to live in these areas can have the effect of raising rents and driving out existing residents. Other changes to the owner/tenant ratio can also occur, thereby changing the character of the community toward shorter terms of residence. This effect would be particularly noticeable in Charlestown.

(2) Demographic Distribution Changes. New uses can also cause an influx of people of different incomes, races, ages, ethnic origins and political beliefs. These changes are not always undesirable, but care should be taken to minimize and to assure that local residents are not deprived of their community.

(3) Size of Community. Any new development which significantly alters the size of the community by major additions or deletions to the numbers of residents or labor force will impact all other factors which are part of community quality.



## DISPLACEMENT OF HOUSING AND BUSINESS

No reuse package will greatly affect the surrounding communities by takings. In Charlestown, McAvoy's Bar will be displaced by road improvements suggested to accompany redevelopment. This bar has been losing business since the closing of the Shipyard and is reported to be willing to relocate.

## TRANSPORTATION

(1) Traffic Volumes on Local Streets. Increase in traffic volumes disrupt a community and create a safety hazard. The existing and projected traffic volumes for each package are discussed in Section IV. Road improvements have been suggested for both sites, and these effects on local traffic have also been noted.

(2) Mass Transit. In Charlestown, the relocation of the Orange Line City Square Station to the vicinity of Bunker Hill Community College will decrease rapid transit service to the site. An increase in bus service can be expected, especially with demand created by the National Historic Park and the reuse of the balance of the site. The size of this demand is estimated in Section IV.

(3) Street Pattern Changes. These changes as well as new uses can alter traffic volume on existing streets. Both the Charlestown and South Boston Communities are very concerned that traffic, particularly truck traffic, be decreased on their local streets. Changes in the street pattern in and around these residential communities are discussed in the package descriptions.

## ECONOMIC IMPACT

(1) Jobs. New employment which will result from new uses is detailed in Section V.

(2) Taxes. Income for the City from taxes on the new uses is also detailed in Section V.

(3) Induced Development. Some associated economic development may occur with new land uses. For example, there may be pressure to provide eating and drinking places or tourist accommodations. The zoning ordinance will control this to some degree, but this sort of development also creates jobs and income. In

Charlestown, Mass Port has already announced development plans for the area in front of Hoosac Pier on Water Street.

### AESTHETIC

(1) Physical Alterations. Redevelopment will make changes in the physical appearance of both sites, especially where non-industrial uses are proposed. This affects both the property values of the adjoining neighborhood and the impression of the area residents and the visitor or person who passes by on the highway.

(2) Changes in Scale, Density, Character. Scale refers to the size relationships of buildings to each other, their physical environment, and to the activities and people they harbor. Density includes the number of people living or working per unit area and the number of buildings per unit area. The character of an area is defined not only by scale and density, but also by architectural period, landscaping, condition of the buildings and grounds, texture, color, views, and so on.

It is possible for development on one site to impact the character of residential areas, the National Park or commercial uses of nearby areas, as well as leading to changes in the character of sites. These aesthetic changes are discussed in the description of each redevelopment package.

### HISTORIC

(1) Environment. The Shipyard in Charlestown is included on the National Register of Historic Places and is entitled to protection against adverse effect under the National Historic Preservation Act of 1966. The Yard itself presents an historic record which will be altered to different degrees and in different ways in each development package.

(2) Valued Structures. While the entire Boston Naval Shipyard is on the National Register of Historic Places, the National Park Service and the BRA have identified a number of buildings of particular historic interest recognizing that some of the later built buildings and some of the temporary buildings are not of major historic interest. The impact of renovation, alteration or demoli-

tion of these buildings is noted in the description of each package.

The wall which forms the boundary of the Shipyard along Chelsea Street behind the Commandant's House is directly affected by all packages. A 500-foot section of this 100 plus year old wall would have to be taken or moved to accommodate a two-way connection between Chelsea and Water Streets. This solution also requires the taking of 35,000 square feet of the Yard itself.

#### WATER QUALITY

(1) Sewage. The MDC currently handles most of the discharge from the Yards. Industrial wastes which do not meet their standards are treated and dumped into the harbor. Further study is necessary to determine the loadings on the existing systems of proposed development alternatives and their impact on the MDC/EPA water quality improvement plan.

(2) Runoff. Surface runoff to the harbor is substantial from these heavily paved sites. According to a recent Council on Environmental Quality study, runoff is a source of serious water pollution in urban areas. Consideration should be given to treating this water before it is drained into the harbor.

#### AIR QUALITY

Air pollution is emitted from stationary and moving sources. Evaluation of air pollution impacts of proposed reuses of the Naval Shipyard has to take into account the effects of background sources and the contributions of the several elements of the development packages and vehicle trips they create - at some future time. To carefully predict and evaluate future air quality requires:

- (1) Field sampling of existing sources;
- (2) Knowing the specific use and transportation trip numbers and characteristic associated with each development package; and
- (3) Interpretation of federal, state and city regulations affecting future air pollutant emissions from background and new sources.

Within the scope of this study, it was only

possible to:

- (1) Identify and discuss the relevant regulations affecting proposed reuses of the Naval Shipyard sites (see Appendix A); and
- (2) Determine the qualitative distribution and relative importance of pollutant categories due to the use mix of each development package.

#### NOISE

Both the Charlestown and South Boston sites are presently exposed to fairly high noise levels generated, for the most part, by transportation facilities. These noise levels are not expected to change significantly in the foreseeable future.

In Charlestown, traffic on the Tobin Bridge creates noise levels of  $L_{10} = 70\text{dBA}$  on a line parallel to and approximately 130 feet from its edge. Occasional over flights by aircraft using runway 33L at Logan International Airport produce peak levels of 80 to 85 dBA on the ground.

The South Boston site is directly in the flight path of Logan Airport's heavily used runway 22. Aircraft generate noise levels in the 90 to 100 dBA range on the ground.

Since relatively little can be done to significantly reduce existing externally generated noise levels, site uses are somewhat constrained. In Charlestown, noise sensitive uses will have to be located away and buffered from the Tobin Bridge. In South Boston, non-industrial uses are not desirable. Internally generated noise such as that due to fans, machinery, or power-generated can be reduced by a variety of measures. If such noise abatement measures are used, the contributions to general noise levels from reuses of the Shipyard will not be objectionable.





CHARLESTOWN  
PACKAGE A  
INDUSTRIAL/  
INSTITUTIONAL

This package represents the least change from past use of the Charlestown site. Industrial reuse of existing buildings on 50 acres is combined with renovation to tourist related and to institutional uses in the 16 acres containing most of the historic buildings (historic area). The National Park Service acquires the Ropewalk in this scheme and administers it as part of the proposed National Historic Park.

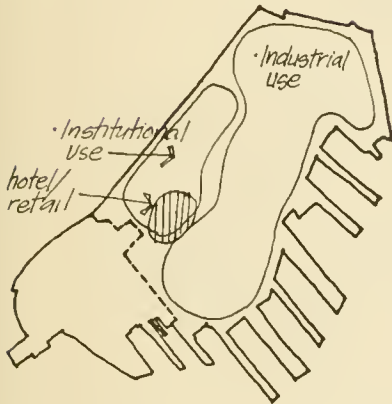
In the remainder of the historic area are a museum, a hotel, retail shops, and a school facility to train high school students for industrial and trade jobs. In the space above the retail shops, it is possible to locate offices and loft-type uses. This space needs minimal renovation, assuming that activities wishing to locate there would be looking for inexpensive space.

Circulation for the commercial and institutional space in the historic area would be essentially separate from industrial traffic, except for the entrance/exit to the site at Gate 5. Auto traffic is limited to Second Avenue and visitors to the National Park and the historic area are encouraged to leave their cars at the parking garage near the entrance. There is some parking provided adjacent to building 36 which is reused as retail space. The hotel provides valet parking for its guests. The existing streets are open to service access, but are reserved principally for pedestrian circulation.

Public open space is limited to the existing streets, and those areas created by the removal of later additions to the historic buildings and by removal of less historically significant buildings. This space is landscaped and refurbished for pedestrian use.

Because this alternative relies on reuse and renovation of existing buildings, and limited changes on the site, it can be more quickly implemented than the other development package proposals for Charlestown. A discussion of the staging of development appears in Section V, Economic Analysis and Marketability.

Approximately one million square feet of industrial space on 50 acres of land is made available in this alternative. Buildings remaining include 195 and 42 which are large machine shops, 104, the ship fitters shop,



Major use areas in Package A.

INDUSTRIAL

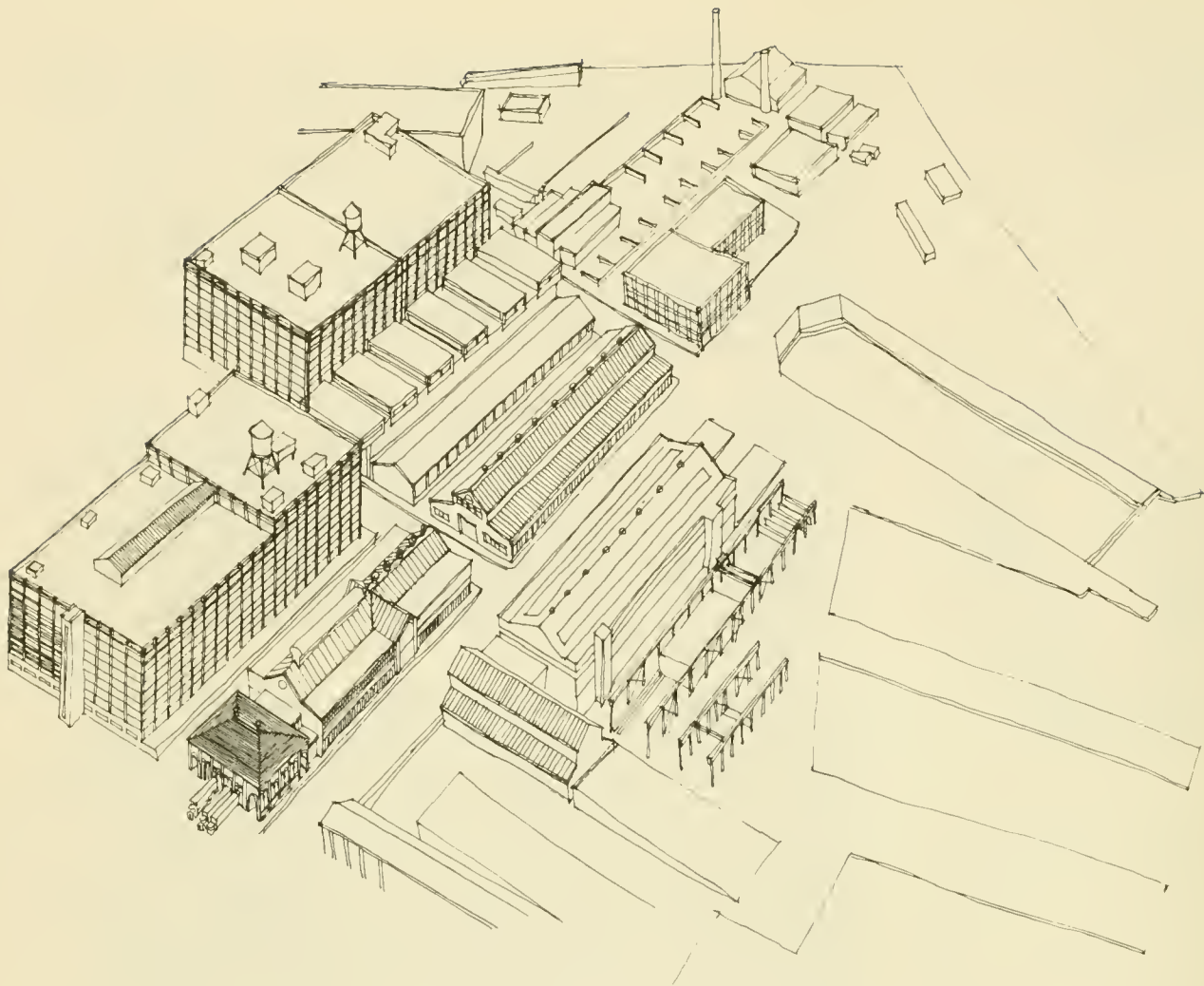


FIGURE III-8

Aerial view of existing structures in the north end of the site. Present buildings are closely spaced with restricted truck access and limited building expansion possibilities.

105, the chain forge, 197, the electronics building, and 114, the woodworking shop. The power plant is retained to supply steam, electricity and compressed air to these and other remaining industrial buildings. On the north end of the site there are approximately 9 acres of cleared land suitable for locating new industrial buildings.

The industrial area also includes dry docks 2 and 5. The area around dry dock 2 is reserved for industrial use and access from the National Park and institutional areas is not permitted. Dry dock 5 is in questionable condition. It may be possible to repair it, but in this package it is shown as being filled with material from the demolished buildings. This created land would then be available for development of structures not requiring piles. Piers 4, 9, and 10 are in poor condition according to the engineer's report and so are removed.

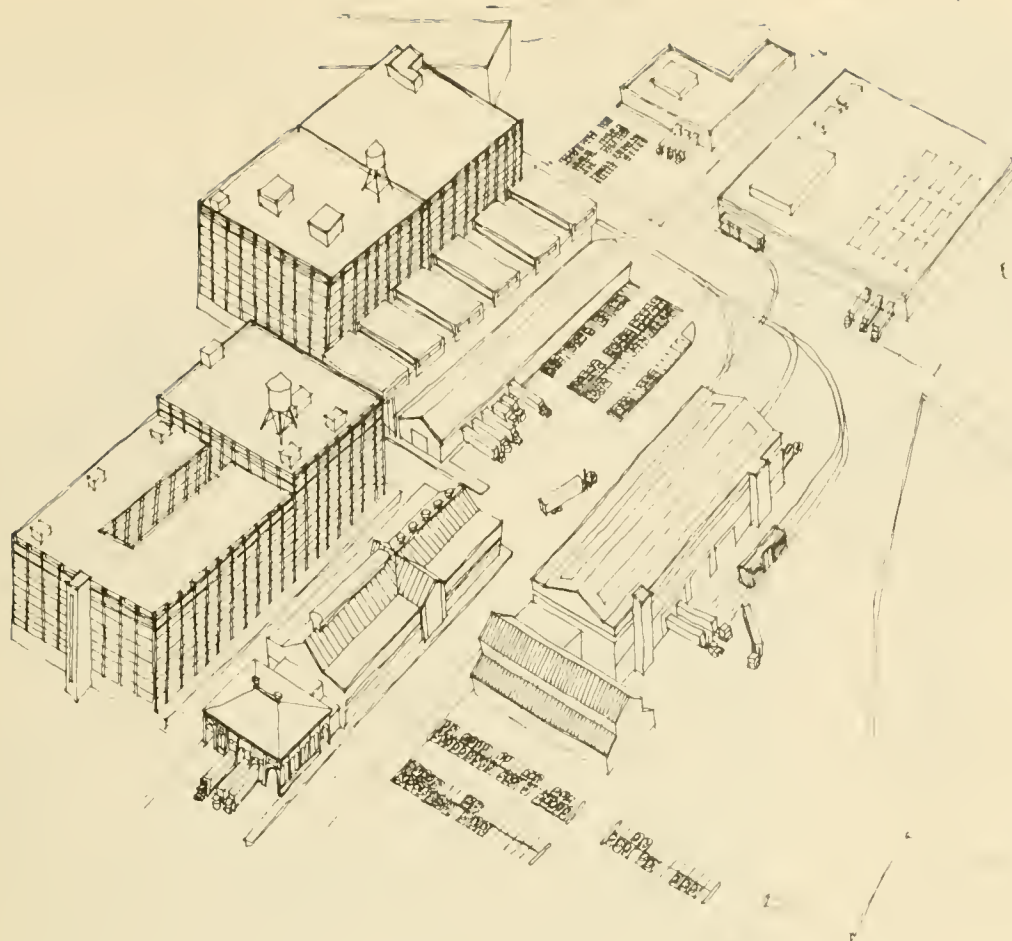


FIGURE III-9

Possible configuration of buildings after selective demolition and filling of dry dock 5. Sketch shows cleared land used for truck service areas, parking, and new construction.

The various kinds of industry which would find this site a suitable location are discussed in Section V, Economic Analysis and Marketability. Because of the heavy investment by the Navy in the buildings and equipment, industries which can reuse these facilities would put the site to best use. Other industries related to the sea, dependent upon it, or producing equipment for it are also suitable. Because of the high cost of in-city land, any industry not requiring a harbor site and the kind of equipment and buildings already on the land would probably not find the location economically attractive. Therefore it can be assumed that any industrial reuse of the site is predicated on maximum reuse of the buildings and minimum demolition.

Circulation in the industrial area is separated from users of the rest of the site, except at the point of access at Gate 5. The path to any individual building is circuitous, a situation necessitated by the arrangement of the



existing buildings. This disadvantage is overcome somewhat by the provision of truck service access to every building through the construction of truck courts made possible by building demolition.

Building 106 is demolished to provide a truck court and service access to the ship fitters shop, a storehouse (building 75), and the forge. A temporary addition to building 195 is removed to provide service to that building. Service areas are also provided adjacent to building 114 and in place of the shipways between buildings 104 and 42. 650 auto parking spaces are available on various parts of the site.

#### INSTITUTION AND RETAIL

In the historic area, institutional and retail uses support and take advantage of activity in the National Park and preserve the character and scale of the historic buildings. This section of the Shipyard is linked to the harbor by the Park itself and is close to the continuing industrial activity on the remainder of the site. The atmosphere approximates the character of the yard throughout its history, providing a living museum of Naval shipbuilding industry. The whole area lends itself to easy pedestrian movement and access to and from the Park. It is a place for families to extend their National Park visit by eating, looking (and buying) in the shops, staying in the hotel if they are from outside Boston, and visiting the other marine/industry/technology related museums.

Hotel. Two granite buildings (33 & 38, see Figure III-10) which formerly served as dormitories are converted to a hotel. Their proximity to the Park reinforces commercial retail and restaurant activities on the ground floors of buildings 34 and 36, discussed below.

The hotel offers family style accommodations aimed primarily at visitors to the Park. It has 200 rooms, dining facilities and meeting rooms. The buildings converted to this use have high ceilings and are of an appropriate width for rehabilitation to hotel use. As barracks, they formerly housed an auditorium which has been retained.

The Ropewalk lies along one border of the institutional and retail area. In this



FIGURE III-10

View along Second Avenue toward the National Park site showing hotel and retail uses in building 33.

development package it is suggested that the National Park Service maintain the Ropewalk, Tar Shed, and Hemp Storage buildings as a part of the National Historic Park. These buildings when used for exhibits would bring visitors into another historic section of the Shipyard where they could visit the additional attractions provided there. A number of Charlestown residents are strongly in favor of the National Park Service acquiring Ropewalk. The Park Service is considering this as an expansion option if adequate funds are appropriated.

Retail. The retail uses are located in the first floors of three buildings on the edge of the National Park. Restaurants, souvenir shops, and other services are likely to wish to locate close to this tourist attraction. The buildings renovated for this use are historic granite three- and four-story structures. Like the rest of this part of the

yard the buildings are suitably human in scale. The 30,000 square feet which have been allocated for retail use can be expanded if the market warrants by using the upper floors now attributed to hotel and/or museum use. There is parking located adjacent to one of the buildings and direct auto access to each building.

Museums. Two buildings are converted for museum use. The museums chosen to locate here should be of general interest, preferably related in some way to naval history, technology, Boston's history, or transportation in general. They are somewhat further from the Park than the retail uses but are closer to the entrance and parking area. Together with the retail stores, the Ropewalk, and the restaurants, the museums create an area of considerable interest for the tourist, capable of absorbing large crowds while maintaining an intimate scale for these activities.

One of the two buildings, number 39, was used by the Navy for office and administration. This building has some structural problems which should be thoroughly investigated, but the general layout of the building is such that it can be successfully renovated for display space. The floor to floor height is approximately 12 feet. The second building, number 107, was a storehouse and repair shop. Its ceiling heights are approximately 16 feet, allowing display of larger items. The space in this building has not been cut up, leaving considerable flexibility in rehabilitation. Both buildings are brick, but have later additions and lean-to structures attached. These are demolished in this alternative to improve the appearance of the facades, and to improve circulation and access on the existing streets. Parking is provided in building 199, converted to a large parking structure.

School. Building 149 was formerly a ten-story warehouse with ceiling heights of approximately eight feet. The Boston School Committee has expressed an interest in locating two new programs and the expansion of two existing programs on this site. This building can serve these purposes if the low ceiling height is acceptable for classrooms.



The existing educational programs considered for the site are: Work/Study (high school) and Skills Center Training. These programs have a current enrollment of 900, and could be expanded to 2000 students.

The new programs are adult trades training and an Institute of Commerce serving 9th grade through adult students. Enrollment in these two programs could be as many as 3000 students. This location provides easy access for training in industrial jobs as well as some exposure to hotel and retail enterprises. The Committee indicated their need for 500,000 square feet of usable space. This building has a gross area of 686,000 square feet. It can be suitably rehabilitated for classroom, shop and laboratory space.

Access to the school building occurs directly from the access road and the adjacent parking garage in order to minimize any conflict between large numbers of students and tourists. However, because school is in recess during the periods when most visits to the Park will occur, this conflict will not be severe.

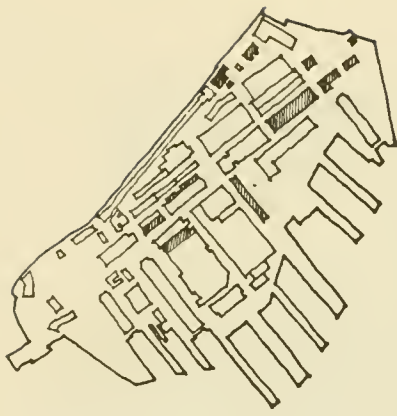
Office/Loft. A need of unknown dimension for inexpensive clean space for small office or cottage industry uses is anticipated. The space in the buildings where retail use occurs on the first floor requires a minimal renovation effort to make this space suitable for that use. Parking needs for these uses have not been projected because rental would take place over a long period of time, the requirements are unpredictable, and it was felt in any event the additional need would not be large.

Parking. Building 199 is converted for parking use by the addition of access ramps and the closing off of existing elevator shafts. The structure has been used as a warehouse and has sufficient floor loadings for parking. Conversion provides space for 800 cars and serves the needs of the school, museums, and hotel, and part of the needs of the retail and National Park. Section IV, Transportation, discusses parking and transportation in detail.

## DEMOLITION

Demolition work necessary in the institutional area of Package A consists primarily of removing the peripheral sub-structures and additions to the main buildings to expose the original facades of the historic buildings and





Buildings demolished for Package A are shown shaded.

## SPECIAL RE-USE CONSIDERATIONS

to free-up and enhance the circulation around these buildings. An infill building between the machine shop (building 195) and the Sail Loft (building 36) is shown removed to create a parking area near the hotel.

The purpose behind demolition in the industrial area of Package A is to make easier truck maneuverability and access to the buildings and to create larger parcels of open land where new industrial building can take place.

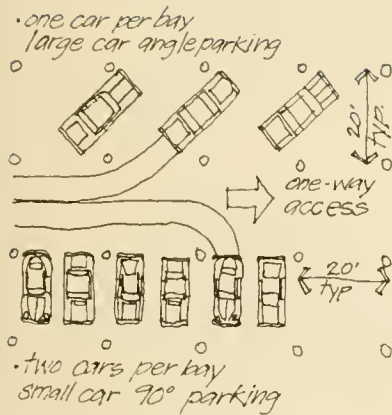
Re-use of the buildings for industrial purposes in Charlestown Package A assumes new tenants with operations scaled similarly to the former Shipyard, so that only minor repair and modification of these buildings would be required to meet new tenant needs.

The possibilities for School Department use of the Storehouse (building 149) are enhanced by the building's regular 20 foot-square bays and the light well which, if opened or recovered with transparent glazing, could provide the interior portions of the building with natural light. Several passenger and freight elevators exist in this ten-story building.

Hotel use of the Enlisted Men's Quarters (building 33) and the personnel support facility (building 38) are possible because of the regular window spacing and 65 foot width of the building which will reasonably accommodate a double-loaded corridor layout for the rooms. Extensive interior plumbing and mechanical work is necessary to provide facilities for each room. The two-story theater in building 38 has re-use possibilities as a hotel function room.

Retail uses of the ground floor of the buildings in this area may be restricted because of the relative opacity of the walls at street level. New or larger openings in the walls may prove costly or structurally difficult to achieve. However the floor areas and column layout of these buildings seem to offer adequate if not excellent possibilities for retail/restaurant uses. The location adjacent to the proposed National Park and the character of these historically valued buildings may be their most marketable feature.

Museum use of the public works building, (107) may be restricted to certain scaled displays dictated by circulation patterns that are limited by the long and narrow shape of the building. However museum use of the administration building, (39) offers more possibilities in organization, layout, and displays due to its central stairway and large areas on either side of the stairway.



Parking use of the large storehouse building, (199) requires the removal of glazing from the walls and the removal and covering of the elevator shafts. There is ample room to the north of this building to build exterior access ramps either of the drum type or linear inclined ramps. The 20' x 20' bay sizes of this building limits the parking to one car per bay with angle parking. While this is an inefficient layout for a garage, it is probably the only comfortable and fast way for customers to park their own cars. This situation could be alleviated somewhat by providing areas or whole floors of parking restricted to small cars, whereby it would be possible to fit two cars per bay at 90° parking and still have comfortable clearances for vehicle maneuverability.

## SITE INFRASTRUCTURE

### Utilities

The utility systems at the Shipyard are extensive but can be characterized as aging. According to the engineer's report, a level of acceptability for most utilities can be achieved with minor repair work, but a few require extensive work or replacement. This study assumes that all utilities on the site will be retained for industrial use in Package A with the necessary upgrading taking place to bring these utilities into operating condition. The specifics can be found in the engineer's report. Summarized, they are as follows:

- (1) The sanitary system requires upgrading at Piers 4, 5, and 6 and rehabilitation of manholes is necessary.
- (2) The storm drain system needs minor cleaning and flushing and manhole rehabilitation.
- (3) The fresh water system requires replacement of piping and valves on Piers 3, 5, and 7.

- (4) The steam system needs a moderate amount of general rehabilitation.
- (5) The electrical system requires major upgrading by either complete replacement of 2.4 kilovolt (kv) lines and equipment or by removing the 2.4 kv system and expanding the 13.8 kv system to serve the entire site.

Utilities not needing extensive repair work are the salt water distribution system, the hot water system, the compressed air system, the industrial gas system, and the oxygen system.

#### Streets and Parking

Access to the site is through the improved Gate 5 area. A separation of industrial traffic and traffic to the rest of the site is shown by using Second Avenue to serve the institutional/hotel area and using First Avenue as the primary distributor of industry vehicles.

Parking for the institutional area is primarily in the converted storehouse building 199, with some additional hotel parking in a surface lot behind the Sail Loft.

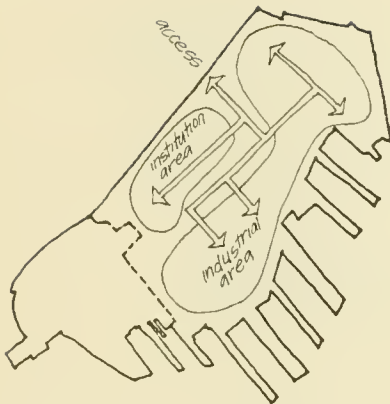
The streets for the industrial area provide access to each industrial building and are shown as extensions of service truck docking areas at the major industrial buildings retained. Parking for the industrial area will primarily be in these service areas and in surface lots as required with new building construction.

#### Rail System

A discussion of the rail system and necessary improvements can be found in Section IV, Transportation, of this report.

#### Waterfront

Pier 9 and part of Pier 10 are removed in this development package because of poor condition. The remainder of the piers are used for industrial purposes after necessary repair work is done. Dry dock 2 is retained as an operating dry dock and ship repair facility and dry dock 5 is filled to increase and improve the geometry of the developable industrial land in that area.



Street pattern for Package A.

ASSESSMENT OF  
ENVIRONMENTAL IMPACT

Public Facilities and Services

(1) Fire Protection. Impact is not different from other packages according to the Fire Chief and will not require additional units or facilities beyond present proposals.

(2) Police Protection. Impact is not different from other packages and will not require additional units or facilities beyond present proposals.

(3) Schools. Because of increased jobs, more blue collar workers may wish to move to Charlestown and send their children to school there. However, the shortage of housing units and extremely low turnover rate will prevent this change from being significant.

(4) Solid Waste. Industry generally contracts privately for disposal of solid waste.

(5) Water Supply. Similar to Naval Shipyard demands.

(6) Open Space and Recreation. No recreation is provided on the site for the workers or the school students. This will undoubtedly cause more intense use of the existing facilities at Barry Playground and the Kent School.

(7) Health, Day Care, Library. Very little impact anticipated.

Community Resources

(1) Shopping, Churches, Family Service Centers. Very little extra demand.

(2) Resources Provided by New Uses. The new school in this package will provide a resource to the community in the opportunity to learn skills and trades and to benefit from community programs offered through the school.

The National Park will provide access to the waterfront and additional open space, in spite of the expected restrictions of closing at 7 p.m.

Demographic Changes

(1) Impact on Housing Market. There will be additional pressure for housing from blue



collar workers employed on the site. Students are expected to commute from their homes. Actual changes will probably not be great.

(2) Demographic Distribution Changes. It is unlikely these will be significant.

(3) Size of Community. Unlikely to change.

#### Displacement of Housing and Business

Minimal; not different from the other packages; no residential takings foreseen.

#### Transportation

There will be an increase of tourists on the streets, parking and walking to the National Park, Bunker Hill, and Charlestown's other attractions. See Section IV, Transportation.

#### Economic Impact

See Section V, Economic Analysis and Market-ability.

#### Aesthetic

(1) Physical Alterations. In the historic area the removal of minor structures and landscaping will return the historic buildings to approximately their original form and character. The area will be open to the public, breaking down somewhat the barrier between the Shipyard and the neighborhood. There will be very little physical alteration in the industrial area.

(2) Changes in Scale, Density, Character. There will be very little change in these aesthetic aspects.

#### Historic

(1) Environment. In the industrial area the character of the Shipyard will not change. In the historic area there will be an upgrading of the environment by changing it from industrial to commercial and institutional.

(2) Valued Buildings. Building 79, a storehouse built in 1852, will be removed in order to widen Gate 5 to provide access to the site. All other buildings of value are retained and improved by the removal of later, non-

architecturally valuable additions. Buildings 33 and 38, formerly barracks, are rehabilitated for hotel use; buildings 34 and 36, formerly offices and the Sail Loft, are rehabilitated for retail and office use; and building 39, formerly administration, is reused for a museum. Building 120, the infirmary, is converted to office and retail use, while the Forge, building 104, and a storehouse building 74, continue in industrial use. The Ropewalk, building 58, and associated buildings are retained by the National Park Service.

#### Water Quality

Details of the impact of this package on water quality have not been determined.

#### Air Quality

Air quality: the three major emission sources for this alternate are: 1) mobile sources 2) stationary sources and 3) building demolition and construction. The heaviest impact to be expected from mobile sources, closely followed by stationary sources.

Mobile source emissions include: a) new rail access route- the principal emissions of carbon monoxide, hydrocarbons, and nitrogen oxides are from diesel locomotives. Of secondary magnitude are particulates and sulfur oxides. b) "private" motor vehicles to support the museum, hotel, school, etc. emit carbon monoxide, hydrocarbons and sulfur oxides as their principal pollutants with particulates and sulfur oxides secondary. c) Light/heavy duty trucks using diesels have carbon monoxide and nitrogen oxides as principal emissions and particulates, sulfur oxides, and hydrocarbons secondary. d) ship operations, using inboard powered diesel vessels in berth have sulfur oxides, carbon monoxide and nitrogen oxides as principal emissions and particulates and hydrocarbons of secondary magnitude. e) Buses, again using diesels, have carbon monoxide and nitrogen oxides as principal emissions and particulates, sulfur oxides, and hydrocarbons as secondary emissions.

Stationary sources assume no on-site solid waste combustion. a) on-site power and steam generation from an oil fired power plant has particulates, sulfur oxides, and nitrogen oxides as principal emissions and carbon monoxide and hydrocarbons as secondary emissions. b) ship building.

operations include: metal working shops which emit some particulate matter; solvent storage whose principal emission is hydrocarbons; surface coating which involves emissions of hydrocarbons of principal magnitude; on-site boilers (non-ship) have particulates, sulfur oxides and nitrogen oxides as principal magnitude emissions and carbon monoxide and hydrocarbons secondary; fabrication contributes particulates as principal emissions and sulfur dioxide, carbon monoxide, hydrocarbons, and nitrogen oxides as secondary in magnitude; ship test boilers have particulates, sulfur oxides, and nitrogen oxides as principal emissions and carbon monoxide and hydrocarbons of secondary magnitude; finally boiler cleaning and overhaul and sandblasting have particulates as a principal magnitude emission.

Building demolition and construction have particulates as a principal magnitude emission and carbon monoxide, hydrocarbons, and nitrogen oxides as secondary.

#### Noise

(1) National Park and Extension. Accessible outdoor areas should be 150 feet or more from the projected edge of the Tobin Bridge roadway and 200 feet or more from any dry dock or similar area of industrial use where loud outdoor activities are likely to take place.

(2) Power Plant. The ship design facility, school, Park, and museum should be separated from the power plant by at least 200 feet (more or less depending on actual noise output). Fenestration in these quieter facilities on sides facing the power plant should be avoided or minimized.

(3) Parking. Instead of concentrating the parking facilities in one area, parking lots should be used to create relatively quiet buffer zones between noisy activities such as heavy industry, power plant, and truck and rail access routes and activities requiring lower background noise levels, such as museum, school, and ship design facility.

(4) General. Since no residential or similar land use requiring low ambient noise levels at night is apparently contemplated in this scheme, unusual noise restrictions on fixed equipment within the area, other than the power plant, are not necessary.

## COSTS

Table III-1 shows the unit cost and order-of magnitude cost estimates for rehabilitation, new construction, and demolition in this package. An explanation of the derivation of the unit costs appears in the appendix.

## PACKAGE A COST ESTIMATES

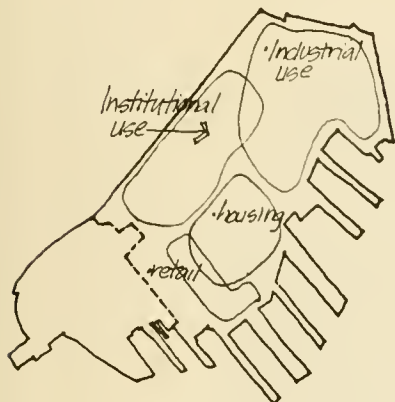
TABLE III-1

<u>Proposed Use</u>	<u>Area or Bldgs Rehabilitated (Sq. Ft.)</u>	<u>Unit Cost</u>	<u>Cost Estimate Rehabilitation</u>	<u>New Constr Bldg Area</u>	<u>Unit Cost</u>	<u>New Constr Cost Estimate</u>	<u>Total Constr Cost Estimate</u>	<u>Demolition Estimate</u>
1. <u>ACCESS</u>						\$ 375,000	\$ 375,000	\$ 55,500
2. <u>INSTITUTIONAL</u>								
School Dept.	686,600	\$25/S.F.	\$ 17,000,000				\$ 17,000,000	
Museum	165,600	\$21/S.F.	3,500,000				3,500,000	
Hotel	90,000	\$20,000/Rm	4,000,000				4,000,000	
Retail	29,500	\$12/S.F.	360,000				360,000	
Parking	546,000	\$ 5/S.F.	2,730,000				2,860,000	\$ 43,000
Open Space				130,000 S.F.	\$1.75/S.F.	228,000	228,000	140,500
Office/Loft	108,000	\$12/S.F.	1,300,000				1,300,000	
3. <u>INDUSTRIAL</u>								
Industry (Incl. Power Plant)	1,179,000		\$ 560,000	130,000 S.F.	\$14/S.F.	\$ 1,900,000	\$ 2,460,000	\$ 620,000
S U B T O T A L							\$ 31,708,000	\$ 875,000
4. <u>PIER DEMO.</u>							\$ 180,000	
5. <u>PIER REPAIR</u>							\$ 1,085,000	
6. <u>UTILITIES</u>							\$ 2,230,000	
7. <u>EXTERNAL COSTS</u>							\$ 720,000	
8. <u>BLDG. DEMO.</u>							\$ 875,000	
T O T A L							\$ 36,798,000	





CHARLESTOWN  
PACKAGE B  
HOUSING/INDUSTRIAL/  
INSTITUTIONAL



Major use areas in Package B.

Development Package B is made up of uses in the middle range of the possibilities which have been investigated. Demolition is more extensive than in Package A but considerably less than in Package C; There is a mid-sized hotel, a moderate amount of housing, and slightly more than half the amount of industry that appears in Package A. The over-all cost of development is midway between the costs of Packages A and C. Industry occupies 28 acres on the north end of the site, the historic area is devoted to institutional uses, and a complex of housing, hotel, and marina uses is located on the waterfront adjacent to the proposed National Park.

The institutions include museums and a state college. As in Package A, office and loft-type uses can be located above the retail space in renovated buildings.

The inherent problems of locating industry near housing have been mitigated by separation of the circulation systems and by providing parking as a buffer between the two uses. The commercial and housing areas are also intended to be oriented toward the waterfront and the view to downtown. This orientation will minimize impact from the industry.

The public open space system in this plan extends throughout the institutional, hotel, and housing areas and includes pedestrian circulation. There is continuous pedestrian access from the Park to the marina, passing in front of the commercial store fronts. This space is landscaped and paved for heavy pedestrian use. There are benches and other "street furniture" to make stopping and strolling pleasant experiences. Dry Dock 2 is flooded to bring water deep into the site, and to facilitate the connection with the National Park. The institutional area is reserved for pedestrian traffic (except for service vehicles). One of the focal points of the historic area is a large plaza created by removal of the power plant.

HOUSING/HOTEL/RETAIL

This area of the site was chosen for the most intensive commercial activities and luxury housing because it is located on the harbor's edge and adjacent to the National Park. The open space along dry dock 2 is connected to the Park so that visitors can see the commercial areas as their destination. A restaurant

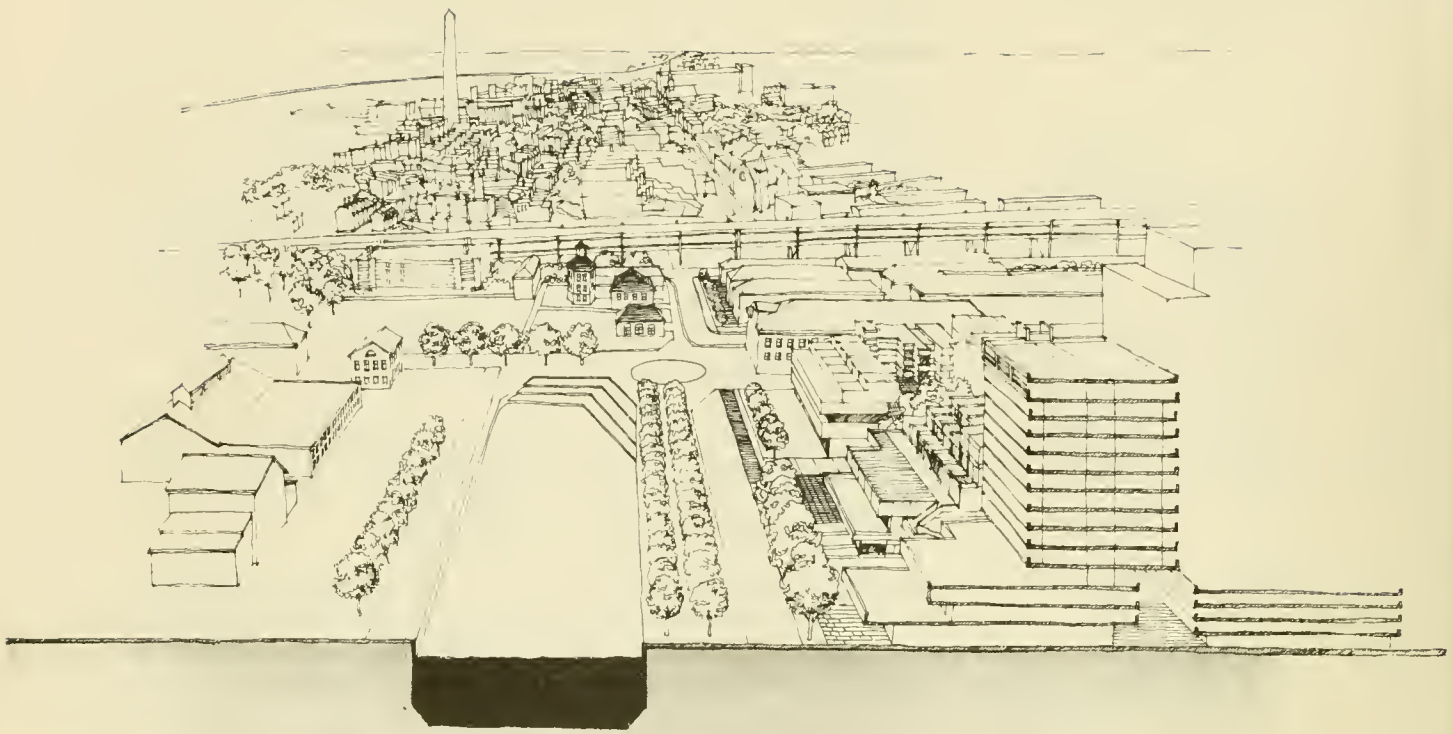


FIGURE III-11

Aerial perspective view of cross-section cut through dry dock 2 and new hotel looking toward Charlestown. New housing and retail development is shown beyond the hotel.

located on the end of one pier, and a marina on another, enable visitors to experience the harbor. Boat rental, sales and servicing, and fishing along the promenade add to the excitement and focus to the waterfront. The Navy buildings have been completely demolished, all buildings in this area are new construction.

Access to this area is primarily through Gate 5 and then down First Avenue. A loop road around the housing provides access to parking adjacent to the retail and to the hotel. First Avenue also connects with Gate 4, which is used mainly as egress from the site. (See Section IV, Transportation, for further detail.)

Housing. 500 units of luxury housing in high-rise, mid-rise, and townhouse buildings are located on 10 acres of land. This housing should take advantage of the views of downtown and the harbor and should have a smaller scale relationship with the institutional area across First Avenue. Any towers should be located in a way that avoids forming a continuous wall along the water's edge. Parking

is provided on the site, adjacent to the buildings and most probably in structures.

On-site facilities for the housing should include a convenience grocery store, social rooms, maintenance shop, management offices, and a swimming pool. The buildings should be buffered from conflicting adjacent uses such as high traffic streets, large crowds, sources of air and noise pollution.

Retail. The 75,000 square feet of retail space is located along dry dock 2, connecting the Park and institutional area with the waterfront. Shops selling antiques, imported goods, designer furniture, and other specialty items would find this an exciting location. Landscaped open space provides a pleasant walk, bordered by the shops on one side, the dry dock filled with water on the other, and a view out to the harbor beyond. An additional 6,000 square feet of retail space has been renovated in building 36, and more space is available on the piers if the market calls for it.

These stores offer items of interest both to the tourist visiting the National Park, and to greater Boston area residents as a specialty shopping center. There is at least one major restaurant located on the piers, and perhaps others in the retail buildings. (See Figure III-11)

Circulation is reasonably direct from Gate 5, and there is parking provided immediately adjacent to the stores. The restaurant would be served by valet parking.

Hotel. A 400-room hotel is located on the waterfront. It has dining and banquet facilities as well as a modest number of meeting and function rooms. It serves out-of-town visitors to the Historic Park, both families and business persons who wish to see the Boston area from a convenient location. Its position at the water's edge gives it excellent views of downtown Boston and the harbor.

Parking is provided in an attached structure. Its proximity to the marina allows for the possibility for transient mooring where the passengers could spend the night in the hotel.

Marina. A 200-slip marina is shown in this alternative located off pier 7 directly in



front of the housing. The slips are constructed by floating docks and hanging catwalks from the existing pier to accommodate the tidal action of the water in the harbor and to allow easy access to recreational type vessels. The marina can be exclusively for transient mooring or can be managed as a permanent storage facility, or a combination of the two.

The attractions of the site, the Park, hotel, retail and museums indicate that transient slips could be viable. On the other hand, permanent mooring is in short supply in the harbor. An existing building in the industrial area could be set aside for small boat repairing and winter storage. Launching would be by crane or on Shipway 2.

Parking for the marina is provided on the pier; overflow capacity is available in the lot adjacent to the industrial area.

#### INDUSTRIAL

On the 28 acres of land designated for industrial use in this alternative, there are 900,000 square feet of building made available. More than half of this space is in one warehouse, building 199. Other important buildings which are reused are 104, the shipfitters shop, 106, the boiler shop, 114, the wood working shop, and several smaller storehouses. Building 105, the chain forge, can be used for industrial purposes, or if the City finds it desirable, can be included in the institutional area as museum or college space. The power plant has been removed to provide open space in the institutional area. This means that the remaining buildings, including those in the industrial area must have individual boilers installed. The removal of the plant has been staged to allow time for this renovation. (See development phasing in Section V.)

On the north end of the site there are approximately 9 acres of cleared land suitable for locating new buildings. The industrial area also includes dry dock 5, which is in questionable condition. It may be possible to repair it, but in this package it is shown as being filled with material from the demolished buildings. This created land would then be available for development of structures not requiring piles; Piers 4, 9, and 10 are in poor condition according to the engineer's

report and are to be removed.

The various kinds of industry which would find this site a suitable location are discussed in Section V, Economic Analysis and Marketability. Because of the heavy investment by the Navy in the buildings and equipment, industries which can reuse these facilities would put the site to best use. Other industries related to the sea, dependent upon it, or producing equipment for it are also suitable.

Circulation and parking in the industrial area is separated from the rest of the site except at the point of access at Gate 5. There is a single major road providing service access to each building. The pre-existing street pattern remains. At least 225 parking spaces are available on the site associated with different buildings.

#### INSTITUTIONAL

In this alternative the institutional area serves as a site for a state college. To enhance the historic theme, the historically valuable buildings are retained and reused while those which are less important and out of scale and character are removed. New buildings, open space, and street furniture are designed to be supportive of this overall scheme. The power plant is torn down to create a large landscaped civic plaza which can serve as outdoor exhibit space. The remaining buildings, as a result, need to be renovated so they can supply their own heat. The transfer to purchased electricity is not difficult.

Major circulation passes around the institutional area, although service access is available on the pre-existing streets which become landscaped pedestrian ways. The loop connects Gates 4 and 5, requiring demolition of the less historically important southern end of the Ropewalk and building 75 near Gate 5. Parking is provided in a converted warehouse (building 149).

Office/Loft. In the infirmary, building 120, and other space which may remain unused for a long period, office space or cottage industry can be located. A minimal amount of renovation could provide suitable moderate rent space for these uses.

College. It is possible that a state-owned college may consider locating on this site.

To serve its population of 1,100, it requires 330,000 square feet of space, including classroom, administrative, and studio space. If appropriate code requirements can be met, these needs can be accommodated in four buildings: 39, 62, 107, and the first floor of 149. Building 39 was used by the Navy for administration, and can be suitably rehabilitated. Building 62, which was the hemp storage building, is well suited for studio space, as is building 107, which was storage and repair shops. Building 149 was a warehouse, and has been connected to parking on the upper floors. The first floor is suitable for the college because of its greater ceiling heights. If the college wishes to expand, the forge, building 105, would be suitable.

In this plan, the Ropewalk is shown as college studio/housing. The building can be divided and rehabilitated to serve as student or faculty living and work space.

With the removal of the power plant it becomes possible to create a campus atmosphere using the new open space. This space also provides for expansion of the college.

Museums. Three buildings are converted for museum use for a total of 230,000 square feet.

Building 33 was formerly barracks, has four floors and a ceiling height of approximately 15 feet. Building 34 was laboratories, materials testing, photographic labs, and reproduction center, also has four floors, and 10-12 foot ceilings. Building 38 was barracks, has four floors, 15 foot ceilings, and a two-story space used as an auditorium. These buildings are granite and very suitable for pedestrian scale activities. They are located close to each other, immediately adjacent to the National Park. As in Package A, the museums chosen for these buildings should be of general interest, preferably having to do with naval history, technology, or Boston's history.

The museums benefit from the campus character of the college as well as from their physical connection to the Park. With landscaping and refurbishing of pedestrian ways, the area is attractive for institutional use and preserves and enhances the historic buildings. Parking is provided in a converted warehouse.





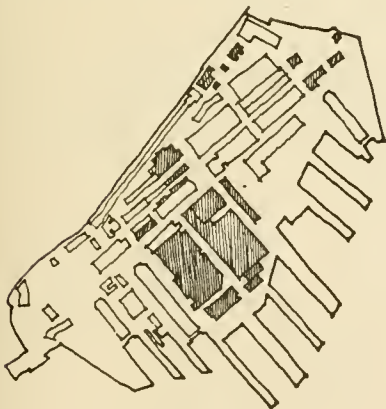
FIGURE III-12

View of the chain forge building (105) reused as a museum. Existing street is shown developed as public open space.

As noted in the industrial section, the forge, building 105 can be used as large display space for a museum or can be included in the industrial area.

Parking. Parking for the institutional area and overflow parking for commercial uses is provided in a converted warehouse, building 149, in the institutional area. Access to this parking is directly from the main entry point at Gate 5. A minimum of 800 cars can be accommodated.

## DEMOLITION



Buildings demolished for Package B are shown shaded.

The major demolition work required for Package B is in the area south of First Avenue between dry dock 2 and building 103. Here, with the exception of the Sail Loft, 36, all existing structures are to be removed to provide an essentially clean site for new housing, hotel, and retail construction. The major existing structures to be removed are the two large machine shops, 42 and 195, the seven-story electronics shop, 197, and the central tool and service shop, 40.

Demolition in the industrial area is limited to clearing the land to the east of Sixteenth Street for purposes of providing large areas of land for new industrial construction. Although there are many buildings here, most of them are of small scale and some are of semi-permanent construction. The major



building in this group is the flammable material storehouse, 131, which is three stories and constructed of concrete and masonry.

In the institutional area the power plant, 108, and the blueprint storage building, 150, are demolished. As mentioned in the package description, this will create a large open space for institutional and public use.

The west end of the Ropewalk, 58, is shown demolished to provide a secondary access to the site by extending Sixth Street to Chelsea Street, and buildings at the Gate 5 area, 79, 96, and 207, are removed to improve the access at that point.

The parking lot between the housing area and the industrial area requires the removal of shipbuilding ways 1.

#### SPECIAL RE-USE CONSIDERATIONS

As in Package A, industrial re-use of buildings in Package B assumes a type and scale of operations of new tenants that would not require major modification of the existing buildings. With the phase-out of the power plant, 108, for this package each tenant would have to provide a new heating source for the buildings.

College housing use for the Ropewalk, 58, seems physically possible by creating through-unit row houses two window-modules wide. Entries for each unit would have to be cut into the facade. The small window-opening size minimizes daylight available to each unit and may be a problem. If allowable, dormer windows in the attic space would create an additional habitable floor. A major problem in using this building for housing may prove to be traffic noise from the Tobin Bridge. Costs for re-use include plumbing and mechanical equipment, firewalls separating the units, and stairways for each unit.

College use of the Ropewalk and test lab, 62, the public works building, 107, and the administration building, 39, seem to present no outstanding problems. Together these buildings offer a variety of spaces that could comfortably accommodate classrooms, seminar rooms, studio space, and offices. Large assembly areas are not provided.

Museum use of the Enlisted Men's Quarters, 33, the laboratories, 34, and the personnel support facility, 38, is limited primarily by restricted types of display due to the size and shape of these buildings. Museum use of the chain forge, 105, seems to offer more possibilities, but requires a tenant of a greater scale corresponding to the size of the building.

Parking in building 149 (storehouse) appears to be physically feasible by providing access ramps in the existing light-well of this building. The limitations of this building used for parking are primarily those of inefficient parking due to the structural bay size (20' x 20') as discussed in Package A.

## SITE INFRASTRUCTURE

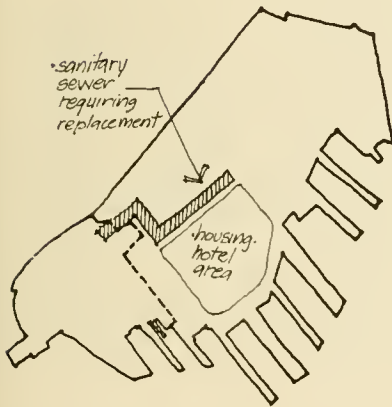
### Utilities

The water and sanitary sewer lines that serve the area indicated as housing, hotel, and retail in Package B are of questionable capacity to meet the demands of these suggested uses and probably should be replaced with lines of greater capacity.

The sanitary sewer line along First Avenue from Ninth Street to the outfall near the telephone exchange building, 31, should be replaced and the laterals south of this line should be upgraded, replaced, or removed as required and new laterals placed to fit new building configurations in this area. The sanitary systems to the north (the institutional area) and the west (the industrial area) are adequate to meet the demands of the suggested uses there and need only minor upgrading and repair work.

The fresh water line to this area may also need replacement. Fresh water at the existing Shipyard is distributed from three points along Chelsea Street and one point at Gate 1. The line from Gate 1 along First Avenue is the main distributor for the housing/hotel/retail area. Water supply is adequate to the remainder of the site and the system is in reasonably good condition according to the engineer's report.

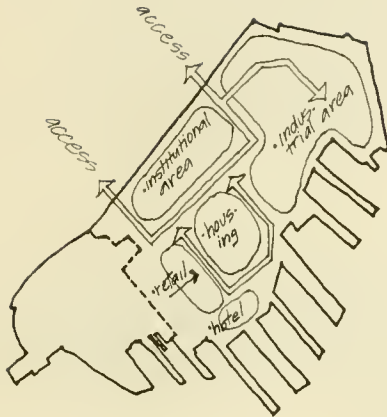
As mentioned in Charlestown Package A, the existing 2.4 kilovolt (kv) electrical system throughout the site should be replaced with new 13.8 kv lines and equipment.



With the demolition of the power plant, 108, for this package all outside hot water-, steam-, and salt water lines could be removed. This means, however, that each building needs to supply its own heat source.

### Streets and Parking

Access to the site is through the improved Gate 5 area and a secondary access created by removing the west end of the Ropewalk, 58, and extending Sixth Street to Chelsea Street.



Street pattern for Package B.

Traffic separation of industry vehicles from other site traffic is achieved by a street to service the industrial buildings which joins the main traffic loop at Gate 5. This industry street is aligned such that truck service areas are created on the east sides of most buildings which provides more maneuvering space for trucks than if service areas occurred between these buildings.

The main traffic loop is from Gate 5 down Thirteenth Street to First Avenue, along First Avenue to Sixth Street, and along Sixth Street to Chelsea Street. A secondary loop to gain automobile access to the waterfront and hotel area starts at First Avenue down Ninth Street to the water's edge, along the waterfront to a roadway just west of the existing Eighth Street, and along this street back to First Avenue. This secondary loop provides parking areas that serve the immediate surrounding retail and hotel uses and allows these uses and the open space to have views and proximity to the water with a minimum of interruption by streets and vehicular activity.

Additional parking is shown in a converted storehouse, 149, which serves the institutional area, and a surface lot on Pier 7 which serves the marina. Parking for the National Park area is shown to be in three surface lots beneath the Tobin Bridge approach. For the most part, parking for the industrial area is included in that area with an additional surface lot that buffers the industrial area from the housing. Housing parking is included in the housing area.

### Waterfront

As in Charlestown Package A, Pier 9 and part

of Pier 10 are removed because of poor condition. The remaining piers are repaired and used for industrial purposes, marina and boat docks, a restaurant, and open space. Dry dock 5 is filled to improve the geometry of the developable industrial land. Dry dock 2 is permanently flooded which will increase the amount of land with water frontage and have the effect of bringing the water edge closer to some of the more "inland" areas of the site.

ASSESSMENT OF  
ENVIRONMENTAL IMPACT

Public Facilities and Services

(1) Fire Protection. Impact is not different from other packages according to the Fire Chief, that is, no new units required are beyond present plans.

(2) Police Protection. No expansion of manpower seen as necessary.

(3) Schools. There will be less pressure from blue collar workers than in Package A, because there are fewer such jobs. The 500 housing units will produce a small number of upper income children who will most likely not have a significant impact on the local schools.

(4) Solid Waste. Industry and hotel and commercial uses are most likely to contract privately for collection, while the housing will be served by the City.

(5) Water Supply. The demand for water has not been estimated.

(6) Open Space and Recreation. Open space is greatly increased by the new waterfront areas and the demolition of the power plant, totaling approximately 14 acres, including the piers. This land will be open to residents of Charlestown as well as tourists and those who live on the site. Nevertheless there may be some competition from college students for existing facilities, since the college has not provided recreation space. Workers may also compete. The housing units will provide some private recreation facilities.

(7) Health, Day Care, Library. The residential units will have some negative impact, although the high incomes of the new residents



suggest it will probably not be severe.

#### Community Resources

(1) Shopping, Churches, Family Service Centers. The residential units will increase the demand for these services, while adding some convenience shopping.

(2) Resources Provided by New Uses. The addition of the college to the area will provide the opportunity for adult education programs, and perhaps participation of college students in community schools and programs.

#### Demographic Changes

(1) Impact on Housing Market. Additional blue collar jobs will increase somewhat the pressure on Charlestown for moderately priced housing. The provision of high-income housing may also increase the pressure from high-income people to renovate existing Charlestown buildings, forcing long-time residents to move. College students will also add to this pressure. However, because Charlestown is predominately owner-occupied, the community is protected from this pressure to some degree.

(2) Demographic Distribution Changes. The new residents will be high-income, most likely young, white, well-educated upwardly mobile professionals. This is a very different group from the poor and working class white families who make up most of Charlestown's population.

(3) Size of Community. An additional 500 units will increase the population by approximately three percent.

#### Displacement of Housing and Businesses

Not different from other packages. There are no residential takings, and only one business taken.

#### Transportation

There will be more tourists visiting the site than in Package A, driving, parking, and walking to the Park, hotel and commercial area, and to Bunker Hill and Charlestown's other attractions. Section 106 and Section 4(F) reports will be required for the

takings involved in transportation improvements. See Section IV, Transportation, for further details.

#### Economic Impact

See Section V, Economic Analysis and Marketability.

#### Aesthetic

(1) Physical Alterations. In addition to returning the historic area to its original form and character by removing later building additions, the area will be improved by the removal of the power plant which is quite out of scale with remaining structures in this area. The large open space will be more appropriate to the historic area. In the industrial area few alterations will take place.

The remainder of the site will be all new uses in new structures which will be very different from the previous environment.

(2) Changes in Scale, Density, and Character. The buildings facing the historic area will be of compatible scale, but the mass of the new area will be large and will dominate the waterfront. The human scale will be maintained through open space and pedestrian circulation paths, and will also allow connections to residential Charlestown. With careful and sensitive design the new buildings can insure that the qualities of intimacy and access to the water are obtained, and that the environment of the historic area is not disrupted. The density of people on the site will be greater. The density of buildings will not change; character will change.

Aesthetic impacts on the adjacent community will be to define the water's edge from a distance by hotel and housing structure, rather than by industrial buildings and cranes.

The National Park will also be affected by the change. Rather than the continuation of Shipyard uses, the tourist will see new accommodations, open space, and commercial and housing areas because of development zoning.

## Historic

(1) Environment. The environment of the historic area will change by increased access to the harbor, as well as by the aesthetic considerations discussed above. It will no longer be surrounded by its traditional industrial use, although some such use will remain. The industrial area's environment will not change, except for the views of new development.

In the commercial and housing area a completely new environment will be created to serve and benefit from the Park and historic areas. The site as a whole, however, will not continue in its historic use.

(2) Valued Buildings. In addition to the moving of the granite wall, one building and part of another mentioned as being of historic value will be removed. Building 79 built in 1852 will be demolished to widen Gate 5. The southwestern end of the Ropewalk, a wooden structure not part of the original building is removed to facilitate access through Gate 4. Buildings 33, 34, 36, and 38 are remodeled for museum use. Buildings 39 and 62 are renovated for the college. Building 105, the forge, can be used for either industrial or college or museum use. The infirmary, 120, is used for office/loft space. Building 75 continues in industrial use. The Ropewalk, 58, is renovated for college housing and work space, with a walkway cut through for pedestrian access from Charlestown.

## Water Quality

Details of the impact of this package have not been determined.

## Air Quality

Air quality: the three major emission sources for this alternate are: 1) mobile sources 2) stationary sources and 3) building demolition and construction. The heaviest impact to be expected from mobile sources, closely followed by stationary sources.

Mobile source emissions include: a) "private" motor vehicles to support the museum, hotel, school, etc. emit carbon monoxide, hydrocarbons and sulfur oxides as their principal pollutants

with particulates and sulfur oxides secondary. b) Light/heavy duty trucks using diesels have carbon monoxide and nitrogen oxides as principal emissions and particulates, sulfur oxides, and hydrocarbons secondary. c) ship operations, using inboard powered diesel vessels in berth have sulfur oxides, carbon monoxide and nitrogen oxides as principal emissions and particulates and hydrocarbons of secondary magnitude. d) Outboard powered vessels (private) have carbon monoxide and hydrocarbons as principal magnitude emissions and sulfur oxides and nitrogen oxides as secondary. e) Buses, again using diesels, have carbon monoxide and nitrogen oxides as principal emissions and particulates, sulfur oxides, and hydrocarbons as secondary emissions. Stationary sources assume no on-site solid waste combustion or on-site power and steam generation. Emissions from Edison must be evaluated for particulates, sulfur oxides, and nitrogen oxides as principal emissions and carbon monoxide and hydrocarbons as secondary emissions. a) small boat construction operations include: metal working shops which emit some particulate matter; solvent storage whose principal emission is hydrocarbons; surface coating which involves emissions of hydrocarbons of principal magnitude; on-site boilers (non-ship) have particulates, sulfur oxides and nitrogen oxides as principal magnitude emissions and carbon monoxide and hydrocarbons secondary; fabrication contributes particulates as principal emissions and sulfur dioxide, carbon monoxide, hydrocarbons, and nitrogen oxides as secondary in magnitude; ship test boilers have particulates, sulfur oxides, and nitrogen oxides as principal emissions and carbon monoxide and hydrocarbons of secondary magnitude; finally boiler cleaning and overhaul and sandblasting have particulates as a principal magnitude emission. Building demolition and construction have particulates as a principal magnitude emission and carbon monoxide, hydrocarbons, and nitrogen oxides as secondary.

### Noise

(1) Historic Area. This area is exposed to a great deal of noise from Chelsea Street and Tobin Bridge traffic and should not be used as an outdoor park.

(2) Retail/Restaurant. These generally



"indoor" uses require no special setbacks from existing and new noise sources for acceptable conditions. These buildings should be used as a buffer zone or as a barrier (if height is sufficient) for more noise-sensitive areas.

(3) Hotel. If designed so that all guest rooms face toward Boston Harbor instead of the Tobin Bridge, this building could also serve as an effective buffer-barrier element.

(4) Housing. The proposed siting with respect to the highway and industry area is favorable. The adjacent parking area could be used as an additional buffer between the housing area and the hotel/retail buildings.

(5) Power Plant. This potentially noisy facility should be separated by a large (200 feet) buffer zone from the noise-sensitive sections of the museum, Park, and school. The large parking facility could be used to act as the buffer zone.

(6) General. The exterior noise levels of industrial machinery as well as cooling and ventilating equipment must be controlled to be compatible with noise-sensitive land uses such as exterior park areas and housing.

## COSTS

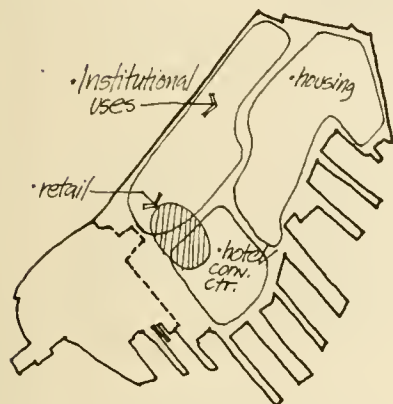
Table III-2 - shows the unit cost and order-of-magnitude cost estimates for rehabilitation, new construction, and demolition in this package. An explanation of the derivation of the unit costs appears in Appendix A.

### PACKAGE B COST ESTIMATES

TABLE III-2

<u>Proposed Use</u>	<u>Area of Bldgs Rehabilitated (Sq. Ft.)</u>	<u>Unit Cost</u>	<u>Cost Estimate Rehabilitation</u>	<u>New Constr Bldg Area</u>	<u>Unit Cost</u>	<u>New Constr Cost Estimate</u>	<u>Total Constr Cost Estimate</u>	<u>Demolition Estimate</u>
1. <u>ACCESS</u>						\$ 723,000	\$ 723,000	\$ 56,000
2. <u>INSTITUTIONAL</u>								
College	301,000	\$25/S.F.	\$ 7,525,000				\$ 7,525,000	
College Housing	164,000	\$23/S.F.	3,772,000				3,772,000	
Museum	248,000	\$21/S.F.	5,208,000				5,208,000	
Retail	19,000	\$12/S.F.	228,000				228,000	
Office/Loft	26,000	\$12/S.F.	312,000				312,000	
Parking	686,000	\$ 5/S.F.	3,450,000				3,450,000	
Open Space				259,000 S.F.	\$1.75/S.F.	\$ 453,000	453,000	\$ 482,000
3. <u>INDUSTRIAL</u>								
Industry	372,000	\$ 7/S.F.	\$ 2,600,000	131,000 S.F.	\$ 14/S.F.	\$ 1,834,000	\$ 4,438,000	\$ 261,000
Warehouse	544,000	\$0.50/S.F.	272,000				272,000	
4. <u>HOUSING/ROTEL</u>								
Housing				500 D.D.	\$30,000/DU	\$ 15,000,000	\$ 15,000,000	\$1,142,000
Hotel				400 Rooms	\$25,000/RM	10,000,000	10,000,000	486,000
Retail				60,000 S.F.	\$33/S.F.	1,980,000	1,980,000	
Marina				200 Slips	\$1250/Slip	250,000	250,000	
Parking						2,969,000	2,969,000	50,000
Open Space				383,000 S.F.	\$1.75/S.F.	670,000	670,000	
<b>S U B T O T A L</b>							\$ 57,250,000	\$2,477,000
5. <u>PIER DEMO.</u>							\$ 180,000	
6. <u>PIER REPAIR</u>							1,085,000	
7. <u>UTILITIES</u>							2,950,000	
8. <u>EXTERNAL COSTS</u>							720,000	
9. <u>BLDG. DEMO.</u>							2,477,000	
<b>T O T A L</b>							\$ 64,662,000	

CHARLESTOWN  
PACKAGE C  
HOTEL/CONVENTION/  
HOUSING/INSTITUTIONAL



Major use areas in Package C.

This package is the most intensive redevelopment plan for the site. There are 1,000 housing units on 20 acres, a 1,000-room hotel with convention center, specialty retail space, a marina, museums, and a college. There is continuous public access along the waterfront. These uses work together to create an active, heavily used urban water edge with continuing centers of activity deeper in the site.

The internal road system provides direct access to the housing and somewhat less desirable access to the hotel and convention center. As in Package B, a new site entrance/exit connection to Chelsea Street is made at the southern end of the Ropewalk. The loop thus provided brings traffic along the southern edge of the institutional area and connects with the loop serving the hotel/convention center. Parking is provided in structures near the hotel and in a converted warehouse near Gate 5.

The public open space system is structured to provide pedestrian circulation separate from all vehicles throughout the entire site and access to the waterfront on a continuous promenade along the water's edge. The remaining piers are converted for visitor and resident use, and with the flooded dry dock 2 provide focal points which permit enjoyment of the shops and the harbor. In the historic area pedestrian streets circulate among the renovated buildings and focus on the large plaza created by the removal of the power plant. The whole open space network is landscaped and provided with benches and other street furniture to create a pleasant atmosphere for stopping and strolling.

HOTEL/CONVENTION/RETAIL

This area of the site was chosen for the most intensive commercial activities because it is located on the waterfront and adjacent to the National Park. The open space along the flooded dry dock 2 is connected to the Park, providing a path for the visitors who can see the commercial areas as their destination. A restaurant and marina located on the end of one pier enable visitors to experience the harbor. Most of the Navy buildings have been demolished; all buildings in this area except the convention center are new construction.

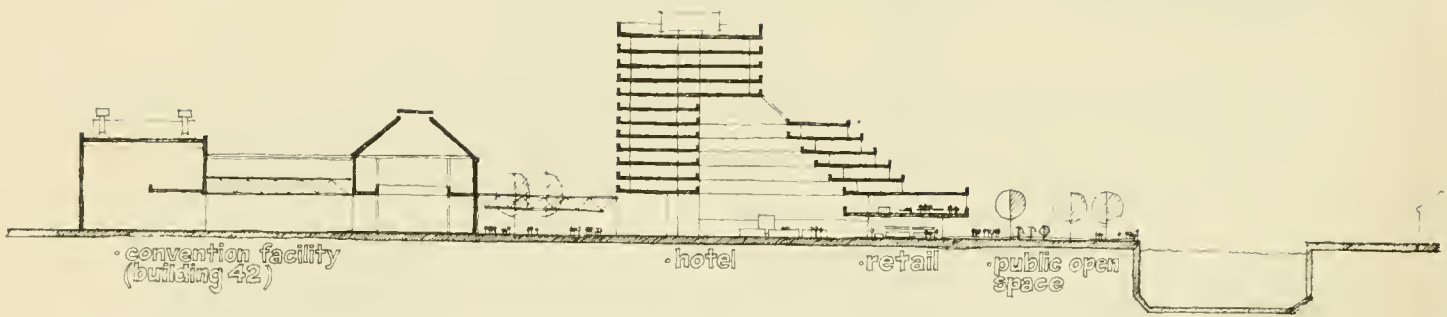


FIGURE III-13

Section through dry dock 2 showing a possible hotel profile and the convention center in the machine shop (42).

Access to this area is primarily through Gate 5 and then down First Avenue. A loop road around the hotel and convention center provides access to parking adjacent to both. First Avenue also connects with Gate 4, which is used mainly as egress from the site. (See Section IV, Transportation, for further detail.)

Hotel. A major 1,000-room luxury hotel is located to maximize views to the harbor. This facility, along with its convention center, is a major new attraction for the City of Boston. The hotel serves both visitors to the site and the Boston Area, and convention people who come specifically to Boston to use the convention center. There are dining and banquet facilities as well as conference rooms, swimming pool, and all the amenities of a first class hotel.

Parking is provided in an adjacent structure. The hotel's proximity to the marina allows for the possibility of transient mooring where the passengers can spend the night in the hotel.

Convention Center. This 180,000 square foot space shall be provided in a renovated Building 42. Under the shell of this workshop, an assembly hall, meeting rooms, and exhibition space are provided in a unique setting. This area is not intended for major exhibitions, but rather to add significantly to Boston's supply of hotel and convention center space.

The hotel public areas and the main parts of the convention building are connected by a gallery, perhaps containing some retail activities.

Retail. The 60,000 square feet of specialty retail space is located along dry dock 2, connecting the Park and institutional area with the waterfront. Shops selling antiques, imported goods, designer furniture and other specialty items would find this an exciting location. Landscaped open space provides a pleasant walk, bordered by the shops on one side and the dry dock filled with water on the other. 19,000 square feet of this retail space has been renovated in building 36, and more space is available in the hotel or on the piers.

These stores offer items of interest both to the tourist visiting the National Park, and to greater Boston area residents as a specialty shopping center. There is at least one major restaurant located on the piers, and perhaps others in the retail buildings.

Circulation is reasonably direct from Gate 5. The restaurant would be served by valet parking.

Marina. A 200-slip marina is shown in this alternative located off pier 5 directly in front of the hotel. As in package B, the slips are constructed by floating docks and hanging catwalks from the existing pier to accommodate the tidal action of the water in the harbor. The marina can be exclusively for transient mooring or can be managed as a permanent storage facility, or a combination of the two.

The attractions of the site, the Park, hotel, retail, and museums indicate that transient slips could be viable. On the other hand, permanent mooring is in short supply in the harbor.

Parking. Parking for the hotel, convention center, specialty shopping, and restaurant will be provided in a new structure adjacent to the convention center. It will accommodate 960 cars. Parking for the marina will be on the pier.

## HOUSING

The 1,000 units on 20 acres are contained in high-rise, mid-rise, and townhouse structures and are luxury class housing. They are mostly one and two-bedroom units catering to professional and business people who want to be near downtown without being in it and who want the recreational advantages offered by the harbor and marina. This kind of resident tends to have few children, and will not place a heavy burden on Charlestown schools.



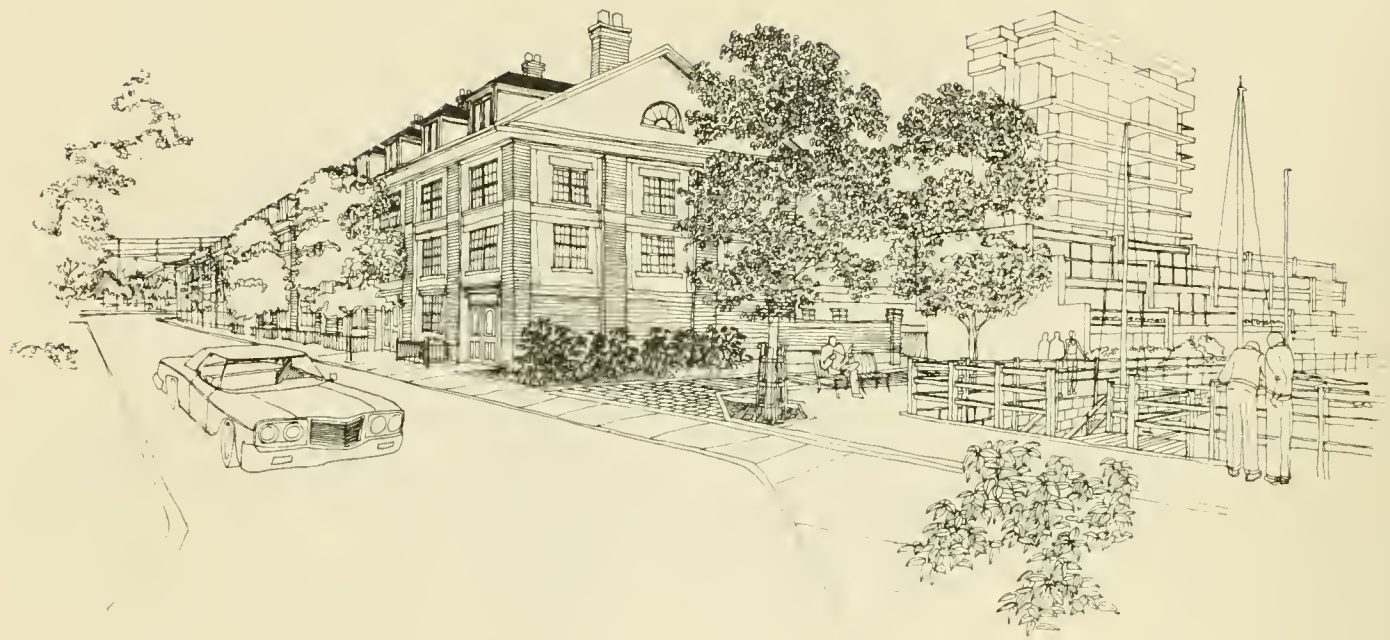


FIGURE III-14

View from the waterfront along Ninth Street toward the Tobin Bridge. The Sheetmetal Shop (103) is shown converted to residential use with new housing development along the water and in the background.

The design of this housing should take advantage of the views of downtown and the harbor. Any towers should be located in a way that avoids direct scale conflicts with the historic three and four floor buildings along the western side of the site. To preserve the view of the harbor and its influence on the whole site, the housing must avoid forming a continuous wall along the water's edge. Parking is provided on the site, adjacent to the buildings and most probably in structures.

On-site facilities for the housing include convenience shopping, as well as social rooms, administrative offices and maintenance shop housed in a renovated building 75. There would also be a swimming pool and outdoor recreation. The buildings should be buffered from conflicting adjacent uses such as high traffic streets, intermittent large crowds, and sources of air and noise pollution.

#### INSTITUTIONAL

In this development package the institutional area serves both as a link between the Park and the commercial waterfront area on its southern edge, and as a site for museums and a state college. The historically valuable

buildings are reused for retail space, office/loft uses, museum and college. Because most of the industrial buildings it served have been removed, the power plant is also removed to provide a campus plaza in the college/museum area. This large area is the focal point of the historic area, and can serve as outdoor exhibition space. Remaining buildings must have their heating system adapted to supply their own heat source. The transfer to purchased electricity is not difficult.

As in Packages A and B, a number of the buildings also had later structural additions which have been demolished to restore original form and approximate the facade of buildings as they were built. Major circulation passes around the institutional area, although service access is available on the pre-existing streets. The loop connects Gates 4 and 5, requiring demolition of the less historically important southern end of the Ropewalk and building 75 near Gate 5. Parking is provided in a converted warehouse (building 199) near Gate 5.

College. It is possible that a state-owned college will locate on this site. To serve its enrollment of 1,100, it requires 330,000 square feet of space. These needs can be accommodated in buildings 38, 107, 114, 62, and 199. Building 38 was formerly a barracks and can be renovated for either studio or classroom use. Buildings 107 and 62 were storehouses and building 114, a woodworking shop. All are in good condition and suitable for renovation to studio use.

Building 199 will be converted to a parking garage, and the first floor reserved for college use, most probably administration space. If the college's enrollment expands to 1,600, a new building can be constructed on part of the site of building 149, which is demolished to provide an additional 90,000 square feet of space.

In this plan, the Ropewalk is shown as college housing. The problem of noise from the Tobin Bridge is significant, and could, upon further investigation be judged to rule out the feasibility of this use. Building 266, formerly officers' quarters can also serve as either faculty or student living and studio space.

Museums. Two existing buildings and one new one provide 200,000 square feet of space for museum use. Building 39 was used by the Navy for offices and administration. The general layout of this building is such that it can be successfully renovated for display space. The height between floors is approximately 12 feet. Building 105, formerly the forge, would accommodate well the display of large items, and the construction of interior platform systems and adaptive spaces. This alternative shows a new building as an addition to the forge on the site of building 149, which has been demolished.

The museums, like the college, profit from the demolition of the power plant and creation of a large open space at the center of the institutional area. The space leads directly to 9th Street which gives views and access to the harbor.

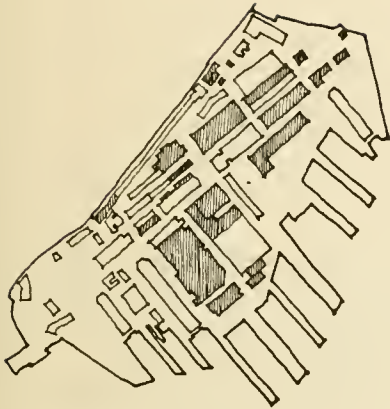
Retail. The first floors of buildings 33, 34, and 36 on the edge of the National Park are devoted to retail use. Restaurants, souvenir and antique shops, and stores serving tourists and college students are likely to be interested in locating here. This retail space will draw visitors from the park to the museums and the larger retail area toward the waterfront. The buildings renovated for this use are historic granite three- and four-story structures. Like the rest of this part of the yard, the buildings are suitably human in scale.

Office/Loft. There is a need of unknown dimension for inexpensive clean space for small office or arts and crafts kinds of uses. The space in the buildings used for retail on the first floor requires a minimal renovation effort to make this space suitable for that use. College students might find the space useful for their needs. Parking requirements for these uses have not been projected because rental would take place over a long period of time, the requirements are unpredictable, and it was felt in any event the additional need would not be large.



Parking. Building 199 is converted for parking use by the addition of access ramps and the closing off of existing elevator shafts. The structure has been used as a warehouse and has sufficient floor loadings for parking. Conversion provides space for 800 cars and serves the needs of the college, museums, and retail in the renovated buildings, and part of the needs of the National Park. Please refer to Section IV, Transportation, for further parking detail.

## DEMOLITION



Buildings demolished for Package C are shown shaded.

Housing development in the area shown in Package C requires the removal of all existing structures except building 103 which has re-use possibilities for housing and building 75 which is historically valued and has re-use possibilities as a convenience store and community facilities for the housing area. The major structures to be demolished are three large industrial buildings, 104, 106, and 187, and many smaller structures at the east end of the site. The two shipbuilding ways are also to be removed.

All structures in the hotel/convention center area should be demolished with the exception of the Sail Loft, 36, and a large section of the machine shop, 42. The major structures to be removed here are the seven-story electronics building, 197, the central tool and service shop, 40, and the other machine shop, 195.

In the institutional area the large storehouse, 149, is demolished to provide land for museum expansion in the chain forge building, 105, and for new construction of college facilities. As in Package B, the power plant, 108, and the blueprint storage, part of 150, are removed to create a large open space for public and institutional use. Other demolition in the institutional area includes the removal of all peripheral substructures and additions to the main buildings to expose the original facades of these historically valued buildings and to free-up and enhance the circulation in the area.

The west end of the Ropewalk, 58, is shown demolished to provide a secondary access to the site by extending Sixth Street to



Chelsea Street, and the buildings at the Gate 5 area, 79, 96, and 207, are removed to improve access at that point.

#### SPECIAL RE-USE CONSIDERATIONS

There are many college re-use considerations in Package C that are similar to Package B. The difference basically is an increase in the number of buildings re-used including the woodworking shop, 114, which provides workshop and studio space that is well-lighted and spacious, the personnel support facility, 38, which provides a large assembly area as well as additional office and classroom space, and the officer's living quarters, 266, which could be used for faculty housing although it is affected by traffic noise from the Tobin Bridge.

Retail uses in the ground floors of the enlisted men's quarters, 33, the laboratory building, 34, and the Sail Loft, 36, are physically possible with the same reservations expressed in Package A.

Residential uses of existing buildings are limited to the storehouse, 75, and the sheet-metal shop, 103. The storehouse can accommodate a convenience store and commercial facilities, having the attributes of suitable size and shape as well as large opening possibilities in the walls. Plumbing, mechanical equipment, and electrical work are necessary additions for this re-use. The sheetmetal shop has some possibility for re-use as housing primarily because it is of an appropriate exterior scale and appearance. Some reservations to this possibility however are the 15 foot column spacing which is somewhat narrow for a good rowhouse layout, and the lack of any residential infrastructure (plumbing, mechanical work, electrical work, stairways, partitions, etc.) within the building. If the building is subdivided into apartment flats or duplexes, the unequal floor-to-floor heights may prove to be a problem. Dormers and skylights can make the attic an additional habitable floor and the addition of dormers, chimneys, doorways, and stoop areas can reinforce the residential character of this building.

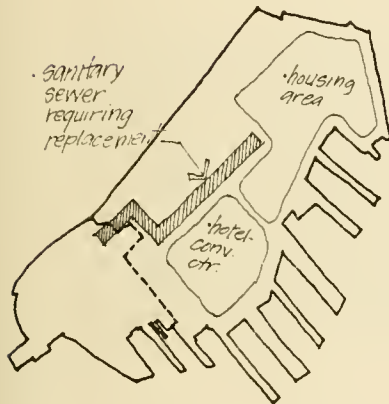
The use of the machine shop, 42, as a convention facility is possible primarily because of its large size and relative location to the hotel. The interior of this building is spacious (although subdivided by many columns) and is well lighted by large sky-

lights above. There are several mezzanine levels in various parts of the building which could be subdivided for meeting rooms and office space. These mezzanines can be expanded by building additional floors across open areas. The structural feasibility of this is likely because the columns and beams in the building now support 5 to 30 ton bridge cranes. A question that needs further study however is whether or not the building meets the programmatic requirements of modern convention facilities.

## SITE INFRASTRUCTURE

### Utilities

New housing and a 1,000-room hotel/convention center in Charlestown Package C are two high-intensity uses that will place large demands on utility systems of the site. The utility lines that serve these two areas on the site will probably need to be replaced with lines of greater capacity.



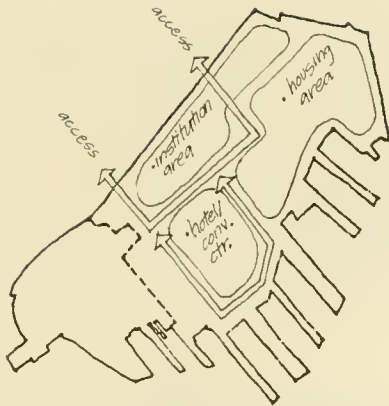
The sanitary sewer line along First Avenue from Thirteenth Street to the outfall near the telephone exchange building, 31, should be replaced and the laterals south of this line should be upgraded, replaced, or removed as required and new laterals placed to fit new building configurations in the housing area. The sanitary system to the north of First Avenue is adequate to meet the demands of the suggested uses there and needs only minor upgrading and repair work.

The water lines to these two high-intensity uses may also need replacement. Fresh water at the existing Shipyard is distributed from three points along Chelsea Street and one point at Gate 1. The line from Gate 1 along First Avenue is the main distributor for the hotel and residential areas. Water supply is adequate to the remainder of the site and the system is in reasonably good condition according to the engineer's report.

As mentioned in Charlestown Package A the existing 2.4 kilovolt (kv) electrical system throughout the site should be replaced with new 13.8 kv lines and equipment.

With demolition of the power plant, 108, for this package all outside hot water-, steam-, and salt water lines could be removed.

## Streets and Parking



Street pattern for Package C.

As in Charlestown Package B, access to the site is through the improved Gate 5 area and a secondary access created by removing the west end of the Ropewalk, 58, and extending Sixth Street to Chelsea Street. The main traffic loop is from Gate 5 down Thirteenth Street to First Avenue, along First Avenue to Sixth Street, and along Sixth Street to Chelsea Street. A secondary loop to gain automobile access to the waterfront starts along Ninth Street to the water's edge, along the waterfront to Sixth Street, and along Sixth Street back to the primary loop. This allows convenient access to most parts of the site, minimizes through-traffic in the housing area, and eliminates automobile traffic (except for service and emergency vehicles) in the institutional area.

Parking for the institutional area is located near the Gate 5 entrance in the converted warehouse building, 199. A second parking structure serving the hotel/convention area is shown at the corner of First Avenue and Ninth Street. Parking for marina use and restaurant is a surface lot on Pier 5. Parking for the housing area is included with that area. Three surface lots under the Tobin Bridge approach serve the National Park area.

## Waterfront

As in Charlestown Packages A and B Pier 9 and part of Pier 10 are removed because of poor condition. The remaining piers are repaired and used for marina and boat docks, restaurant, and open space. Dry dock 5 is filled to increase the developable land in that area. Dry dock 2 is permanently flooded which will have the effect of bringing the water edge deeper into the site.

## ASSESSMENT OF ENVIRONMENTAL IMPACT

### Public Facilities and Services

(1) Fire Protection. Impact is not different from other packages according to the Fire Chief, that is, no new units required are beyond present plans.

(2) Police Protection. No expansion of manpower seen as necessary.

(3) Schools. The 1,000 housing units will produce a small number of upper income children who will most likely not have a significant impact on the local schools.

(4) Solid Waste. The hotel/convention center, commercial and institutional areas will be likely to contract for private collection. The housing will be served by the City.

(5) Water Supply. The demand for water has not been estimated.

(6) Open Space and Recreation. The provision of open space in this package will increase the amount available in Charlestown by about 16 acres. Access to the waterfront will be greatly increased, along with the possibility for recreation provided by the marina. Organized recreation facilities will be provided for the housing. College students, however, may compete with the new residents and current residents for recreation facilities

(7) Health, Day Care, Library. The residential units will have some impact, although because of the high income of the residents, it will probably not be severe.

#### Community Resources

(1) Shopping, Churches, Family Service Centers. The residential units will increase the use of these services, while adding some convenience shopping.

(2) Resources Provided by New Uses. The addition of the college to the area will provide the opportunity for adult education programs, and perhaps the training of college students by practice teaching in the community.

#### Demographic Changes

(1) Impact on Housing Market. This package will add 1,000 units to the housing stock. Because of the high-income character of the development, new demand for renovation to higher income units may be created. However, because Charlestown's housing is heavily owner-occupied, the community is somewhat



protected from this pressure.

(2) Demographic Distribution Changes. The new residents will be high-income, most likely young, white, well-educated upwardly mobile professionals. This is a very different group from the poor and working class white families who make up most of Charlestown's population.

(3) Size of Community. An additional 1,000 units will increase the population by approximately six percent.

#### Displacement of Housing and Businesses

Not different from other packages.

#### Transportation

There will be tourists and convention-goers visiting the site, driving, parking, and walking to the Park, commercial area and to Bunker Hill and Charlestown's other attractions. See Section IV, Transportation, for further details.

#### Economic Impact

See Section V, Economic Analysis and Marketability.

#### Aesthetic

(1) Physical Alterations. In addition to removing later additions to historic buildings and tearing down the power plant, the large warehouse, building 149, is also removed in this package. Suggested as a replacement are an addition to the forge building for museum use, and a new college building.

The rest of the site, with the exception of part of building 42 and buildings 103, 266, 114, and 75, will be entirely rebuilt. These buildings will be renovated for convention center, housing, community facilities, and college use respectively. There will be new buildings for housing, hotel, and retail use.

(2) Changes in Scale, Density, and Character. In the historic area the new buildings, with careful design, can take advantage of and

enhance the existing scale and character because of the removal of the most inharmonious elements.

For the remainder of the site the change will be total: new character, scale, and density. The hotel, convention, and parking structures will be very massive and sensitive design will be required to insure that the human scale of the National Park and the historic area are not destroyed. The housing will also need to be designed to allow access to the water without blocking views for Charlestown residents.

The aesthetic impacts on the adjacent community will be to define the water's edge from a distance by hotel and housing structures rather than by industrial buildings and cranes.

### Historic

(1) Environment. The historic area's environment will change for the aesthetic reasons discussed above, and because the uses surrounding it will no longer be industrial. The area will be a display of historic buildings, where the character of the area has been maintained, but the content changed by introducing new uses, and by opening the area to the public.

On the rest of the site, nothing will remain of the historic Shipyard environment.

(2) Valued Buildings. As in Package B, the granite wall will be moved, building 79 torn down, and the southwest end of the Ropewalk removed for access to the site. Buildings 33, 34, 36, and 120 are reused for retail and office/loft space. Buildings 38, 62, and the Ropewalk are renovated for college use. Building 39 and the forge are adapted to house museums. Building 75 is converted to serve as community facilities for the housing, and building 103 is converted to housing use.

### Water Quality

Details of the impact of this package have not been determined.

Air quality: the three major emission sources for this alternate are: 1) mobile sources 2) stationary sources and 3) building demolition and construction. The heaviest impact is to be expected from mobile sources.

Mobile source emissions include: a) "private" motor vehicles to support the museum, hotel, school, etc. emit carbon monoxide, hydrocarbons and sulfur oxides as their principal pollutants with particulates and sulfur oxides secondary; b) Light/heavy duty trucks using diesels have carbon monoxide and nitrogen oxides as principal emissions and particulates, sulfur oxides, and hydrocarbons secondary; c) Buses, again using diesels, have carbon monoxide and nitrogen oxides as principal emissions and particulates, sulfur oxides, and hydrocarbons as secondary emissions; and d) outboard powered vessels (private) emit carbon monoxide and hydrocarbons of principal magnitude with secondary amounts of sulfur oxides and nitrogen oxides.

Stationary sources assume no on-site solid waste combustion or on-site power and steam generation. Increased loads from Edison may include particulates, sulfur oxides, and nitrogen oxides as principal emissions and carbon monoxide and hydrocarbons as secondary emissions.

Building demolition and construction have particulates as a principal magnitude emission and carbon monoxide, hydrocarbons, and nitrogen oxides as secondary.

#### Noise

(1) Housing. The proposed separation by parking facilities of this noise-sensitive land use from the noisier facilities is favorable; however, a setback of at least 250 feet from the Tobin Bridge to the nearest dwelling unit is desirable. Barriers or deep setback to limit noise from delivery trucks servicing the convention center and hotel during quiet hours is also desirable. Alternatively, restriction of such vehicles to certain hours could be considered. The proximity of the residential area to certain aircraft flight paths implies the need for sound retardant fenestration and masonry walls to afford residents relief from aircraft noise, at least during periods when windows can be closed.

(2) Park Extension. Exterior usage of this facility should be limited to areas which lie at least 150 feet from the projected edge of the Tobin Bridge roadway.

## COSTS

Table III-3 shows the unit cost and order-of-magnitude cost estimates for rehabilitation, new construction, and demolition in this package. An explanation of the derivation of the unit costs appears in the appendix.

## PACKAGE C COST ESTIMATES

TABLE III-3

<u>Proposed Use</u>	<u>Area of Bldgs Rehabilitated (Sq. Ft.)</u>	<u>Unit Cost</u>	<u>Cost Estimate Rehabilitation</u>	<u>New Constr Bldg Area</u>	<u>Unit Cost</u>	<u>New Constr Cost Estimate</u>	<u>Total Constr Cost Estimate</u>	<u>Demolition Estimate</u>
1. <u>ACCESS</u>						\$ 323,000	\$ 323,000	\$ 56,000
2. <u>INSTITUTIONAL</u>								
College	302,000	\$25/S.F.	\$ 7,550,000	90,000 S.F.	\$39/S.F.	\$ 3,510,000	\$ 11,060,000	\$1,379,000
College Housing	191,000	\$23/S.F.	3,907,000				3,907,000	
Museum	161,000	\$21/S.F.	3,381,000	40,000 S.F.	\$36/S.F.	1,440,000	4,821,000	
Retail	43,000	\$12/S.F.	516,000				516,000	
Office/Loft	149,000	\$12/S.F.	1,788,000				1,788,000	
Parking	273,000	\$ 5/S.F.	1,365,000				1,365,000	
Open Space				309,000 S.F.	\$1.75/S.F.	540,000	540,000	490,000
3. <u>ROTEL/CONVENTION</u>								
Hotel				1,000 Rooms	\$40,000/Rm	\$ 40,000,000	\$ 40,000,000	\$ 780,000
Convention Ctr	180,000	\$28/S.F.	\$ 5,040,000				5,040,000	
Retail				60,000 S.F.	\$33/S.F.	1,980,000	1,980,000	
Parking						5,487,000	5,487,000	340,000
Marina				20,000 S.F.	\$10/S.F.	200,000	200,000	
Open Space				383,000 S.F.	\$1.75/S.F.	670,000	670,000	85,000
4. <u>HOUSING</u>								
Housing	63,000	\$23/S.F.	\$ 1,449,000	970 D.U.	\$45,000/DU	\$ 43,650,000	\$ 45,099,000	\$ 789,000
Comm Facil	27,000	\$15/S.F.	405,000				405,000	
Open Space				214,000 S.F.	\$1.75/S.F.	375,000	375,000	
8 U S T O T A L							\$123,576,000	\$3,919,000
5. <u>PIER DEMO</u>							\$ 180,000	
6. <u>PIER REHAB</u>							1,085,000	
7. <u>UTILITIES</u>							3,450,000	
8. <u>EXTERNAL COSTS</u>							720,000	
9. <u>BUILDING DEMO</u>							3,919,000	
T O T A L							\$132,930,000	





SOUTH BOSTON  
PACKAGE A  
INDUSTRIAL PARK

In this alternative, the South Boston Naval Annex is shown redeveloped as an industrial park. Buildings in poor condition or not suited to industrial reuse are demolished, leaving 1.1 million square feet of industrial space. Possible industrial uses for the site are discussed in Section V, Economic Analysis and Marketability. A circulation pattern is laid out and the streets and lighting improved. Repairs are made to the bulkhead, and the piers are removed or repaired if their condition warrants it. The land is divided into parcels which each have access to one or more streets. These parcels can be combined or further subdivided to improve their marketability.

Parcel 1. This 5-acre piece of land has as its main feature a dry dock built between two piers. There is some repair work which must be done on the piers to bring them up to good condition. A third pier has been demolished. All the buildings on this parcel have been removed. Direct access to Northern Avenue is available.

Parcel 2. This parcel of 3 acres has a small amount of bulkhead frontage, but no piers. All buildings have been removed. It is at the gate to Northern Avenue.

Parcel 3. This parcel is adjacent to both existing entrances to the site. In its 7.2 acres, it has three major buildings. Building 17 is set up for vehicle storage, building 19 is a general storage building, and building 32 is a warehouse. Building 19 is in need of extensive repairs, and here is shown demolished.

Parcel 4. This parcel, with 13.3 acres, is at the heart of the site. It has bulkhead access to the water all along its northern side. All the piers formerly attached to this piece of land have been demolished. There are three major buildings on the site. Building 30, formerly a storehouse, has floors and roof in poor condition according to the engineer's report. It is shown demolished in this alternative. Buildings 18 and 53 will also require repairs. The first has been used for ship repair; the second, storage space.

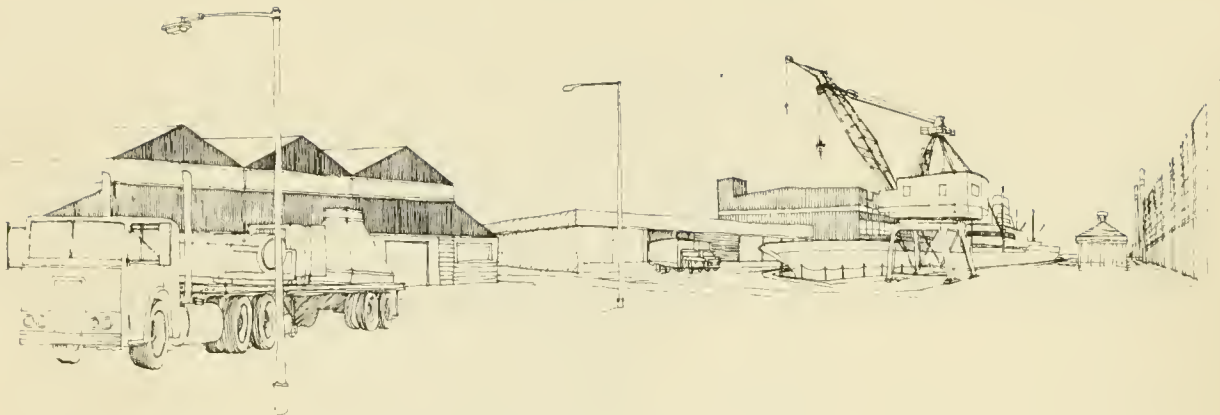


FIGURE III-15

South Boston Annex and dry dock 3 with new industrial construction between building 18 and building 16.

Parcel 5. Parcel 5, containing 10 acres, is mostly cleared land near the Summer Street entrance to the site. Buildings which remain are 20, the heating plant, and 49, a maintenance shop. The heating plant can either be leased to a contractor to provide heat to the site, or sold to the industrial park developer. If the plant does not continue in use, all remaining buildings will have to be modified to provide their own heat.

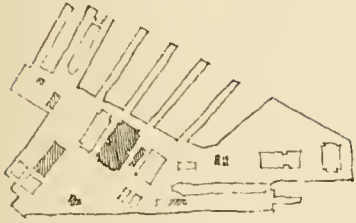
Parcel 6. The main feature of this 5-acre parcel is dry dock 3, 1,175 feet long and 190 feet wide. The land attached to it houses the pump and cranes to serve the dry dock. The Navy has some interest in contracting privately for the operation of this dry dock for repair of its ships. Half of building 21, which was formerly used as office space, is worth saving. Buildings 22 and 23 are removed.

Parcel 7. This parcel of 9.6 acres contains two important buildings. Building 54 is a warehouse, and Building 16 is a large storehouse building in need of substantial repair. This parcel borders the dry dock area, has a small amount of waterfront and can generally be considered an interior lot, with road access to the Summer Street Gate.

Parcel 8. Two sides of this 7.5 acre parcel are concrete wharves on the harbor. There are no buildings on the land, which is nearly the farthest from either gate.

Parcel 9. At the extreme end of the site, farthest from the gates, this 6.3 acre parcel has three sides of concrete wharves on the harbor. Building 31, a warehouse of 80,000 square feet remains if substantially repaired.

#### DEMOLITION



Buildings demolished for Package A are shown shaded.

Demolition in South Boston Package A basically follows the recommendations from the engineer's report, removing those buildings of semi-permanent construction or of extremely poor condition. In addition building 30, a large shop building, is shown removed because of its marginal operable condition and because its removal would better facilitate parking, access, and expansion possibilities for the two neighboring buildings, 53 and 18.

#### SPECIAL RE-USE CONSIDERATIONS

Industrial re-use of buildings in South Boston Package A assumes a type and scale of operations of new tenants that would not require major modification of the existing buildings. Most of the buildings at the Naval Annex are built on-grade which may require the construction or improvement of truck docking areas. None of the present industrial buildings have air conditioning. The bay sizes of the buildings may restrict or dictate industrial processes as none of the existing buildings have clear-span structure.

#### SITE INFRASTRUCTURE

##### Utilities

The extent and condition of utilities at the Naval Annex are discussed in the engineer's report. A summary of utilities and the findings from that report are as follows:

The sanitary system is in generally good condition but requires some pipe replacement, manhole rehabilitation, and cleaning of the system. The storm drain system needs some pipe replacement, manhole rehabilitation, cleaning the system, and the installation of tide-gates. The salt water distribution system is in good condition and no repair work is necessary. The steam system is in good overall condition but requires some new lines, insulation, and expansion joints. New piping is required for the fuel and



gas distribution system. The compressed air system requires some new piping. The largest undertaking in upgrading the utilities is in the electrical system which will eventually require replacement of all 13.8 kv and 2.4 kv feeders, obsolete switchgear, and an old transformer.

### Streets and Parking

The diagrammatic plan of Package A shows access to the site at the Summer Street entrance and at the Northern Avenue gate. The basic existing street pattern on the site is retained with some minor streets shown removed to increase the size of development parcels. The existing pavement is in good condition except for the street along the waterfront at Piers 1, 2, 3, and 4 which is in poor condition and is affected by a settling roadbed probably caused by the deteriorating seawall in that area; and the pavement on B Street along dry dock 3, and South Wharf needs patching or resurfacing. New street lighting is required.

Parking is included in each development parcel depending on tenant requirements.

### Waterfront

Piers 1, 2, 3, 4, and 7 are removed because of poor condition. The remaining piers and wharves need rehabilitation work for re-use. Dry docks 3 and 4 are in operating condition and are shown retained for dry dock use. The bulkhead at Piers 1, 2, 3, and 4 is deteriorating and requires repair.

## ASSESSMENT OF ENVIRONMENTAL IMPACT

### Public Facilities and Services

(1) Fire Protection. Impact is not different from other packages according to the Fire Chief, that is, no new units required are beyond present plans.

(2) Police Protection. No expansion of manpower seen as necessary.

(3) Schools. An increase in blue collar jobs may cause some increase in the number of families desiring to live and send their children to school in South Boston.

(4) Solid Waste. Industry will probably contract privately for disposal.

(5) Water Supply. Similar to Naval Shipyard demands.

(6) Open Space and Recreation. If workers may wish to form sports leagues, they could be accommodated by the Naval Recreation Area, if it continues in recreational use after disposal by GSA.

(7) Health, Day Care, Library. Minimal impact.

#### Community Resources

(1) Shopping, Churches, Family Service Centers. Minimal impact.

(2) Resources Provided by New Uses. Most likely limited to jobs.

#### Demographic Changes

(1) Impact on Housing Market. There is likely to be some increased demand for moderate income housing in South Boston.

(2) Demographic Distribution Changes. Insignificant.

(3) Size of Community. Very little change.

#### Displacement of Housing and Businesses

None.

#### Transportation

See Section IV, Transportation, for details.

#### Economic Impact

See Section V, Economic Analysis and Marketability.

#### Aesthetic

(1) Physical Alterations. Some existing buildings will be removed, and there is room to build new industrial buildings, but it is unlikely that this alteration will have much impact.

(2) Changes in Scale, Density, and Character. Perhaps some increase in density.

#### Historic

No impact.

## Water Quality

Details of the impact of this package on water quality have not been determined.

## Air Quality

Air quality: the three major emission sources for this alternate are: 1) mobile sources 2) stationary sources and 3) building demolition and construction. The heaviest impact to be expected from mobile sources, closely followed by stationary sources.

Mobile source emissions include: a) new rail traffic where the principal emissions are carbon monoxide, hydrocarbons, and nitrogen oxides from diesel locomotives. Of secondary magnitude are particulates and sulfur oxides. b) "private" motor vehicles to support the museum, hotel, school, etc. emit carbon monoxide, hydrocarbons and sulfur oxides as their principal pollutants with particulates and sulfur oxides secondary; c) Light/heavy duty trucks using diesels have carbon monoxide and nitrogen oxides as principal emissions and particulates, sulfur oxides, and hydrocarbons secondary; d) Buses, again using diesels, have carbon monoxide and nitrogen oxides as principal emissions and particulates, sulfur oxides, and hydrocarbons as secondary emissions; e) Waterbourne industrial traffic emissions include sulfur oxides, carbon monoxide, and nitrogen oxides as principal emissions with particulates and hydrocarbons secondary.

Stationary sources assume no on-site solid waste combustion. a) on-site heating and steam generation from an oil fired power plant produce particulates, sulfur oxides, and nitrogen oxides as principal emissions and carbon monoxide and hydrocarbons as secondary emissions. No on-site power generation is planned, therefore emissions from Edison should be evaluated. b) shipbuilding operations include: metal working shops which emit some particulate matter; solvent storage whose principal emission is hydrocarbons; surface coating which involve emissions of hydrocarbons of principal magnitude; on-site boilers (non-ship) have particulates, sulfur oxides and nitrogen oxides as principal magnitude emissions and carbon monoxide and hydrocarbons secondary; fabrication contributes particulates as principal emissions and sulfur dioxide, carbon monoxide, hydrocarbons, and nitrogen oxides as secondary in magnitude; ship test boilers have particulates, sulfur oxides, and nitrogen oxides as principal emissions and carbon monoxide and hydrocarbons of secondary magnitude; finally boiler cleaning and overhaul and sandblasting have particulates as a principal magnitude emission, c) Rail repair facilities

# PACKAGE A COST ESTIMATES

TABLE III-4

<u>Proposed Use</u>	<u>Area of Bldgs Rehabilitated (Sq. Ft.)</u>	<u>Unit Cost</u>	<u>Cost Estimate Rehabilitation</u>	<u>New Constr Bldg Area</u>	<u>Unit Cost</u>	<u>New Constr Cost Estimate</u>	<u>Total Constr Cost Estimate</u>	<u>Demolition Estimate</u>
1. <u>ACCESS</u>						\$ 723,000	\$ 723,000	
2. <u>INDUSTRIAL</u>								
Industry	828,000		\$ 348,000	345,000 S.P.	\$14/S.P.	\$ 5,168,000	\$ 5,516,000	\$ 858,000
Support Bldgs.	24,000		10,000				10,000	
3. <u>PIER DEMO.</u>							\$ 1,120,000	
4. <u>PIER REPAIR</u>							\$ 1,350,000	
5. <u>BULKHEAD REPAIR</u>							\$ 1,100,000	
6. <u>UTILITIES</u>							\$ 1,790,000	
7. <u>BLDG. DEMO.</u>							\$ 858,000	
TOTAL							\$ 12,109,000	



are a combination of test engine emissions including carbon monoxide, hydrocarbons, and nitrogen oxides as principal sources with particulates and sulfur oxides secondary and of metal working which has some particulate matter as a secondary emission.

### Noise

The South Boston site offers an unfavorable noise climate for any land use involving extensive outdoor noise exposure. While use as an industrial park or container facility is reasonable, since noise levels of external sources may be overwhelmed by sources within the facility, one should consider the hearing loss and safety problems inherent in noisy working environments.

Some basic recommendations for minimizing the noise exposure of personnel within the proposed industrial facilities are:

- (1) Noise exposure of all personnel should meet current OSHA regulations.
- (2) Divide heavy equipment areas from office and administration areas, either by providing separate buildings or vibration isolation of equipment combined with partitions with adequate noise reduction ratings. Steady interior noise levels in these business areas should not exceed 60 dB (A).
- (3) Provide quiet "shelters" for coffee breaks and lunch periods to allow the industrial workers' ears to relax and partially recover from the noise exposure.
- (4) Provide adequate mufflers and silencers on all engines, steam valves, air discharges, etc.
- (5) Provide all offending metallic structures and devices with damping materials to reduce noise levels from the resonant vibrations of these structures excited by rattling and impacts.

### COSTS

Table IV-4 shows the unit cost and order-of-magnitude cost estimates for rehabilitation, new construction, and demolition in this package. An explanation of the derivation of the unit costs appears in the appendix.

SOUTH BOSTON  
PACKAGE B  
CONTAINER PORT/  
INDUSTRIAL PARK

This development package is similar to A, except that the northern end of the site is used for a container facility. In Phase II of the container development, the area where piers 1 - 4 were located is filled to create more land for container use. Buildings in poor condition or not suited to industrial reuse are demolished, leaving 900,000 square feet of industrial space. Possible industrial uses for the site are discussed in Section V, Economic Analysis and Marketability. A circulation system is laid out and the streets and lighting improved. Repairs are made to the bulkhead, and the piers are removed or repaired if their condition warrants it. The land is divided into parcels which each are served by the street system. These parcels can be combined or further subdivided to improve their marketability.

Parcel 1. This 5-acre piece of land has as its main feature a dry dock built between two piers. There is some repair work which must be done on the piers to bring them up to good condition. Pier 7 has been demolished. All the buildings on this parcel have been removed. Direct access to Northern Avenue is available.

Parcel 2. This parcel of 3 acres has a small amount of bulkhead frontage, but no piers. This frontage would disappear when the container port land is filled. All buildings have been removed. It is at the gate to Northern Avenue.

Parcel 3. This parcel is adjacent to both existing entrances to the site. In its 7.2 acres, it has three major buildings. Building 17 is set up for vehicle storage; building 19 is a general storage building; and building 32 is a warehouse. Building 19 is in need of extensive repairs, and here is shown demolished.

Parcel 4. This parcel, with 8 acres, is located at the center of the site. It has bulkhead access along its northern edge. In Phase II of the Container Port development, this area would be filled and the parcel would have no harbor access. Of the two buildings on the site, building 30 is in the worst condition. There has been a break in the bulkhead and some of the fill has washed out from under the building ruining the flooring. The building sits on piles,



FIGURE III-16

Container port use on filled land near pier 1. Buildings 30 and 53 which would be used for industrial purposes are shown in the background.

however, and may be structurally sound. In this alternative the building remains. Building 53, which was used as storage space also remains.

Parcel 5. Parcel 5, containing 8.75 acres, is cleared land near the Summer Street entrance to the site. Building 15 and all other structures have been removed.

Parcel 6. This 3-acre parcel of land has as its main feature a former ship repair building (number 18). It also has access to the harbor which will be cut off in Phase II of the Container Port's development. Building 48, formerly office space, is demolished.

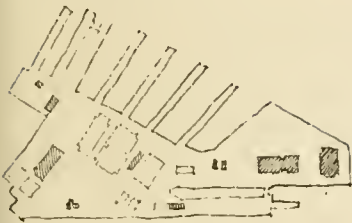
Parcel 7. This 2.25-acre parcel contains both the heating plant (building 20) and a maintenance shop (building 49). If the heating plant does not remain in operation, the heating systems of all buildings on the site will have to be renovated to provide their own heat.

Parcel 8. The main feature of this 5-acre parcel is dry dock 5, 1,175 feet long and 190 feet wide. The land attached to it houses the pump and cranes to serve the dry dock. The Navy has some interest in contracting privately for the operation of this dry dock for repair of its ships. Half of building 21, which was formerly used as office space, is worth saving. Buildings 22 and 23 are removed.

Parcel 9. This 23.5-acre parcel is a peninsula at the end of the site farthest from both gates. This area is shown here as a container port facility. Container terminals require large areas of flat open land where the containers may be trans-shipped to and from ship, truck, and train by crane. All the buildings are torn down to provide this necessary open space.

Parcel 10. The area currently contains 4 piers which are not in suitable condition for use. In Phase II of Container Port use, the entire area will be filled, creating new land.

#### DEMOLITION



Buildings demolished for Package B are shown shaded.

#### SPECIAL RE-USE CONSIDERATIONS

Demolition in South Boston Package B follows the recommendations of the engineer's report to remove those buildings of semi-permanent construction or of poor condition. In addition buildings 16 and 31 are demolished to meet the program requirements of the container port described in the C. E. Maguire Report (New Container Facilities for Mass Port, February, 1974).

Industrial re-use of buildings in South Boston Package B assumes a type and scale of operations of new tenants that would not require major modification of the existing buildings. Most of the buildings at the Naval Annex are built on-grade which may require the construction or improvement of truck docking areas. None of the present industrial buildings have air conditioning. The bay sizes of the buildings may restrict or dictate industrial processes as none of the existing buildings have clear-span structure. In this package the container port is shown to not re-use any existing buildings.



Utilities

The extent and condition of utilities at the Naval Annex are discussed in the engineer's report. A summary of utilities and the findings from that report are as follows:

The sanitary system is in generally good condition but requires some pipe replacement, manhole rehabilitation, and cleaning of the system. The storm drain system needs some pipe replacement, manhole rehabilitation, cleaning the system, and the installation of tide-gates. The salt water distribution system is in good condition and no repair work is necessary. The steam system is in good overall condition but requires some new lines, insulation, and expansion joints. New piping is required for the fuel and gas distribution system. The compressed air system requires some new piping. The largest undertaking in upgrading the utilities is in the electrical system which will eventually require replacement of all 13.8 kv and 2.4 kv feeders, obsolete switchgear, and an old transformer.

Streets and Parking

The diagram of Package B shows access to the site at the Summer Street entrance and at the Northern Avenue gate. The basic existing street pattern on the site is retained with some minor streets shown removed to increase the size of development parcels. The existing pavement is in good condition except for the street along the waterfront at Piers 1, 2, 3, and 4 which is in poor condition and is affected by a settling roadbed probably caused by the deteriorating seawall in that area; and the pavement on B Street along dry dock 3, and South Wharf needs patching or resurfacing. New street lighting is required.

The container port will fill the area now occupied by Piers 1, 2, 3, and 4, and this new land will be paved and lighting provided as part of the container port development costs.

Parking is included in each development parcel depending on tenant requirements.

Waterfront

Filling operations of the container port

ASSESSMENT OF  
ENVIRONMENTAL IMPACT

should alleviate somewhat the costs of pier removal and the need to repair the bulkhead mentioned in Package A. Dry docks 3 and 4 are shown retained for dry dock use.

At this stage of planning, the differences between Packages A and B are very slight. Therefore, the assessment of impact which appears here is identical to that for Package A.

Public Facilities and Services

(1) Fire Protection. Impact is not different from other packages according to the Fire Chief, that is, no new units required are beyond present plans.

(2) Police Protection. No expansion of manpower seen as necessary.

(3) Schools. An increase in blue collar jobs may cause some increase in the number of families desiring to live and send their children to school in South Boston.

(4) Solid Waste. Industry will probably contract privately for disposal.

(5) Water Supply. Similar to Naval Shipyard demands.

(6) Open Space and Recreation. If workers may wish to form sports leagues, they could be accommodated by the Naval Recreation Area, if it continues in recreational use after disposal by GSA.

(7) Health, Day Care, Library. Minimal impact.

Community Resources

(1) Shopping, Churches, Family Service Centers. Minimal impact.

(2) Resources Provided by New Uses. Most likely limited to jobs.

Demographic Changes

(1) Impact on Housing Market. There is likely to be some increased demand for moderate income housing in South Boston.

(2) Demographic Distribution Changes. Insignificant.

(3) Size of Community. Very little change.

#### Displacement of Housing and Businesses

None.

#### Transportation

See Section IV, Transportation, for details.

#### Economic Impact

See Section V, Economic Analysis and Market-ability.

#### Aesthetic

(1) Physical Alterations. Some existing buildings will be removed, and there is room to build new industrial buildings, but it is unlikely that this alteration will have much impact.

(2) Changes in Scale, Density, and Character. Perhaps some increase in density.

#### Historic

No impact.

#### Water Quality

Details of the impact of this package on water quality have not been determined.

#### Air Quality

Air quality: the three major emission sources for this alternate are: 1) mobile sources 2) stationary sources and 3) building demolition and construction. The heaviest impact to be expected from mobile sources, closely followed by stationary sources.

Mobile source emissions include: a) new rail traffic route - the principal emissions of carbon monoxide, hydrocarbons, and nitrogen oxides are from diesel locomotives. Of secondary magnitude are particulates and sulfur oxides. b) "private" motor vehicles to support the museum, hotel, school, etc. emit carbon monoxide, hydrocarbons and sulfur oxides as their principal pollutants with particulates and sulfur oxides secondary. c) Light/heavy duty buses, trucks, auxiliary power units and cranes using diesels have carbon monoxide and

nitrogen oxides as principal emissions and particulates, sulfur oxides, and hydrocarbons secondary. d) ship operations, using inboard powered diesel vessels in berth have sulfur oxides, carbon monoxide and nitrogen oxides as principal emissions and particulates and hydrocarbons of secondary magnitude.

Stationary sources assume no on-site solid waste combustion. a) on-site heating and steam generation from an oil fired power plant emits particulates, sulfur oxides, and nitrogen oxides as principal emissions and carbon monoxide and hydrocarbons as secondary emissions. Increased loads and power demands of Edison should be evaluated. b) ship building operations include: metal working shops which emit some particulate matter; solvent storage whose principal emission is hydrocarbons; surface coating which involves emissions of hydrocarbons of principal magnitude; on-site boilers (non-ship) have particulates, sulfur oxides and nitrogen oxides as principal magnitude emissions and carbon monoxide and hydrocarbons secondary; fabrication contributes particulates as principal emissions and sulfur dioxide, carbon monoxide, hydrocarbons, and nitrogen oxides as secondary in magnitude; ship test boilers have particulates, sulfur oxides, and nitrogen oxides as principal emissions and carbon monoxide and hydrocarbons of secondary magnitude; finally boiler cleaning and overhaul and sandblasting have particulates as a principal magnitude emission.

Building demolition and construction have particulates as a principal magnitude emission and carbon monoxide, hydrocarbons, and nitrogen oxides as secondary.

### Noise

The South Boston site offers an unfavorable noise climate for any land use involving extensive outdoor noise exposure. While use as an industrial park or container facility is reasonable, since noise levels of external sources may be overwhelmed by sources within the facility, one should consider the hearing loss and safety problems inherent in noisy working environments.

Some basic recommendations for minimizing the noise exposure of personnel within the proposed industrial facilities are:



(1) Noise exposure of all personnel should meet current OSHA regulations.

(2) Divide heavy equipment areas from office and administration areas, either by providing separate buildings or vibration isolation of equipment combined with partitions with adequate noise reduction ratings. Steady interior noise levels in these business areas should not exceed 60 dB (A).

(3) Provide quiet "shelters" for coffee breaks and lunch periods to allow the industrial workers' ears to relax and partially recover from the noise exposure.

(4) Provide adequate mufflers and silencers on all engines, steam valves, air discharges, etc.

(5) Provide all offending metallic structures and devices with damping materials to reduce noise levels from the resonant vibrations of these structures excited by rattling and impacts.

## COSTS

Table III-5 shows the unit cost and order-of-magnitude cost estimates for rehabilitation, new construction, and demolition in this package. An explanation of the derivation of the unit costs appears in the appendix.

## PACKAGE B COST ESTIMATES

TABLE III-5

<u>Proposed Use</u>	<u>Area of Bldgs Rehabilitated (Sq. Ft.)</u>	<u>Unit Cost</u>	<u>Cost Estimate Rehabilitation</u>	<u>New Constr Bldg Area</u>	<u>Unit Cost</u>	<u>New Constr Cost Estimate</u>	<u>Total Constr Cost Estimate</u>	<u>Demolition Estimate</u>
1. <u>ACCESS</u>						\$ 723,000	\$ 723,000	
2. <u>INDUSTRIAL</u>								
Industry	828,000		\$ 977,000	230,000 S.F.	\$14/S.F.	\$ 3,220,000	\$ 4,197,000	\$ 468,000
Support Bldgs.	33,000		13,000				13,000	.
3. <u>CONTAINER PORT</u>						\$ 32,000,000	\$ 32,000,000	\$ 428,000
4. <u>PIER DEMO.</u>							\$ 700,000	
5. <u>PIER REPAIR</u>							\$ 1,350,000	
6. <u>UTILITIES</u>							\$ 1,790,000	
7. <u>BLDG. DEMO.</u>							\$ 896,000	
<b>TOTAL</b>							\$ 41,669,000	

# TRANSPORTATION





## SUMMARY PHASE I

### EXISTING TRANSPORTATION SYSTEM

#### Charlestown Site

The region's major radial expressways converge close to the Charlestown Navy Yard and offer the potential for good regional access. The recently opened I-93 expressway offers a high speed route from the northwest and extends to the outlying population centers in the region. The Tobin Bridge and its connections to the Northeast Expressway, Route I and I-95, provides a direct route to the north and northeast (via Route 128). The Massachusetts Turnpike and the Southeast Expressway offer regional access via modern facilities from the west and south through connections to the Central Artery and Tobin Bridge approaches. An additional auto access from the west is available over Storrow Drive-Soldiers' Field Road. All of these routes converge just south of the Shipyard with services concentrated on the City Square ramp system. In terms of proximity to the regional highway system, the Charlestown site is strategically located, but ramp access from the system is restricted to the City Square ramps which are heavily used and inadequately designed. The Charlestown and Prison Point Bridges, while not tied directly to the regional system, do provide access routes from portions of Somerville, Boston, and Cambridge.

Local circulation to the Charlestown Naval Shipyard is centered primarily on Lowney Way, Medford, Chelsea, and Water Streets. Water Street is the principal local street serving Gates 1 and 2 with Lowney Way and Medford Street serving Gates 4 and 5.

Transit service to Charlestown is currently provided by the MBTA's Orange Line which runs in a north-south direction from Boston's Forest Hills section to Everett. This line is functionally typical of all of the system's radial lines with traffic oriented to the Boston Central Business District. Inter-line connections to the other system radials can be conveniently made in the Boston central area with a single transfer. The City Square station on the existing line is within walking distance of Gates 1 and 2, but is approximately 3/4 of a mile from Gate 5. A relocation and extension of this transit facility is now under construction and the



initial section to Wellington Circle will be open in the near future. It will be closely followed by demolition of the existing elevated structure. The timetable for demolition of the elevated is also tied to completion of the MBTA's maintenance shops at Wellington. The Community College station, to the west of City Square, will be the stop closest to the Shipyard. The station relocation puts it beyond walking distance and would require good bus feeder service for transit riders. A direct bus connection to downtown Boston, via the Charlestown Bridge, may offer better service for certain land use combinations.

There are major highway improvement proposals in the immediate area which could dramatically affect accessibility to the site. The existing 2 lane section of the Central Artery-Tobin Bridge-Route 93 complex serves as a "metering valve" which limits flow on the system during daily peak hours. In effect, it means that the full traffic capacity of the Tobin Bridge-I-93 expressways cannot be developed. Various proposals for correcting this problem (which generally include a new connection to Leverett Circle) have been under study for some time and are currently being examined from an environmental impact viewpoint. Even though a major rebuilding program for this complex offers the potential for substantially improving accessibility to the Shipyard, the timetable for implementation is relatively long range (8-10 years) and it is not yet clear that any such program has enough support at the political level to guarantee its implementation. Accordingly, the City should look in other directions in its attempt to provide adequate access to the Shipyard.

Several other system improvements have been proposed in the past. A new span across the Little Mystic Channel generally along the Chelsea Street Alignment was proposed some time ago primarily as a means of diverting truck traffic (from the Moran container facility) from Medford Street. More recently it has been suggested that such a span might also provide railroad access to satisfy the Interior Department's desire to eliminate the present rail spur through the Constitution Park site. When the present elevated transit facility is removed, there will be

an opportunity to very substantially improve traffic operations in and around City Square. This will require a "Topics" type program with channelization and signalization. In addition, razing of the elevated may free up additional capacity on the Charlestown Bridge for motor vehicular use.

#### South Boston Site

The South Boston site lies approximately 1½ miles east of the Massachusetts Turnpike-Central Artery Interchange. The greater spatial separation of this site (i.e. as compared to Charlestown) from the freeway system results in a larger number of alternate access routes. Access from the Regional System is available via the High Street, Atlantic Ave. and Dewey Square ramps (to and from the north), Kneeland Street (to and from the west and south), and West Fourth Street (to and from the south). Local street access is currently available via A and D Streets, Summer Street, and Northern Avenue. Current plans call for the relocation (about 200 feet south of the existing span) and reconstruction of the Northern Avenue Bridge. The Summer Street bridges are currently limited to 12 tons with design studies underway for the span across the Penn Central right-of way.

Rail service to the Shipyard is available over the Penn Central right-of-way which penetrates Mass Port property (between Viaduct Street and the Shipyard) and is tied to the Midland Branch.

The MBTA's South Station site is the closest station to the Annex. Several bus lines linking South Boston and the Army Base to South Station via Summer Street now serve the site. With the exception of the Blue Line, all other radials on the transit system are accessible with a single transfer.

Major proposals which would affect access to South Boston include:

- (1) The rebuilding of Dorchester Avenue
- (2) The reconstruction of the Northern Avenue Bridge
- (3) The depression of the Central Artery
- (4) The Third Harbor Crossing
- (5) The South Boston truck route

The State Department of Public Works and the Boston Redevelopment Authority are now studying the feasibility of depressing the Central Artery through the downtown area. The extent to which the proposal will affect access to South Boston depends upon which alternative, if any, proves to be physically feasible. It should be recognized, however, even if such a plan does prove to be physically feasible, the costs and complexity of such a rebuilding program most certainly place it in the "long range" category and no immediate improvement to access to the Shipyard site can be counted on. The proposed Third Harbor Crossing would link the Massachusetts Turnpike and the South-east Expressway to the Airport access road system and most recent concepts for the tunnel call for a two-lane facility limited to use by buses, airport limousines, and trucks. To the extent that this facility would divert airport traffic (from the south and west) from the Central Artery, it would provide some extra expressway capacity through the critical central portions of the artery. However, in its present form, the tunnel proposal has not received legislative support and again, even if it does, planning, engineering, and construction for the tunnel will take an extended period of time (8-10 years).

The reconstruction of Dorchester Avenue along the Fort Point Channel and its connection to Atlantic Avenue has long been a proposed part of the downtown circulation plan. However, no definite action on the proposal has been taken and none can be expected at least until the questions of the Third Harbor Crossing and the Central Artery depression are resolved.

A new North-South Arterial Street running from Northern Avenue to Dorchester Avenue (Seaport Access Road) has been suggested as a means of diverting traffic from South Boston residential and commercial streets. This facility, which would run along the Penn Central Rail right-of-way is in the very early thinking stages and the time necessary to plan, design, and build it would put it in the "Long Range Improvement" category. Functionally speaking, this facility would serve as an alternate route for motor vehicles bound for the west (via Mass. Pike) and the

south (via the Southeast Expressway).

The Massachusetts Department of Public Works recently held a hearing to present plans for rebuilding the Northern Avenue Bridge over the Fort Point Channel. The reconstruction of this very old structure would also involve its relocation about two hundred feet to the south as well as a relocation of a section of Northern Avenue on the east side of the channel. The plan calls for a direct ramp connection from southbound on the Artery to eastbound on the Bridge and would, under this design concept, significantly improve access to the Northern Avenue section of South Boston. While this improvement project is furthest advanced in development over any of the other projects previously discussed, there is a potential problem to be considered. At present, the City of Boston and the Mass Port Authority are involved in litigation over the issue of a Public Right-of-Way on the eastern end of Northern Avenue. If this issue should be resolved in favor of Mass Port (i.e. no Public Right-of-Way), it is likely that funding the project under the Federal Urban Systems Program (or any other Federal program) would not be possible. This results from the fact that the Bridge approach would be tied directly into a Private Way and, therefore, would not be viewed as part of a "Public System".

#### IDENTIFICATION OF TRANSPORTATION RESTRAINTS

In a general sense, the transportation factors which will affect the possible reuse of the Shipyard are easily identifiable and, in fact, have been discussed in most, if not all, of the prior studies related to the use of these two sites. Clearly, access to each site is presently limited and improvement of their accessibility will be required for other than low intensity land uses. Access is limited both in terms of the regional transportation system and local capacity immediately adjacent to the sites. Specifically, these problems may be summarized as follows:

##### Charlestown Site

- (1) Regional highway access to and from the north via the Northeast Expressway and the Tobin (Mystic River) Bridge involves a routing through the heavily congested City Square area.



- (2) Regional highway access from the south (Central Artery) involves a substandard exit ramp and is complicated on a long-term basis by the Interior Department's desire to eliminate through traffic from its proposed Constitution Park site. The return path to the south involves travel through the edge of City Square from either Gate 1 or Gate 5. The Gate 5 route requires the use of Lowney Way, which is a sensitive community issue.
- (3) Regional highway access from Route 93 would require a difficult and dangerous weaving movement on the Mystic Bridge approach and the return path to the north involves either use of the City Square on-ramp or an alternate route via Medford, Main, or Bunker Hill Streets.
- (4) Local street access from the south is now available through Gate 1 via the Charlestown Bridge and Water Street. Little or no peak hour capacity surplus exists here due to the MBTA elevated structure on the bridge and the complexity of traffic patterns in the Square. The same situation exists for local street access from the south to Gate 5, but the problem is more intense and involves the routing of traffic through residential areas.
- (5) Local street access to and from the north and west require travel over Medford and/or Bunker Hill to Gate 5 or penetration of City Square to Gate 1.
- (6) All of the same routing problems that confront the motorist are, of course, also deterrents to truck access, but the impacts on residential areas would be more significant since the community is already sensitive to truck traffic generated by the Mass Port container facility and the other industrial land uses along Medford Street.

- (7) In addition to eliminating motor vehicle access through the Park, the Interior Department proposes to close the sole rail avenue into the Shipyard. The extent to which rail access would be required will depend on the nature of industrial use, but it appears clear the city should preserve rail access until the Shipyard reuse alternatives are well defined.
- (8) Transit access to the site is via the MBTA's Orange Line and the City Square station, some 1,800 feet from Gate 1. This line is about to be relocated, westerly to the new community college, a distance of approximately 3/4 of a mile. This relocation puts the station well beyond acceptable walking distance and means a significant reduction in service to the site.

#### South Boston Site

- (1) Regional highway access to and from the north to this site is accomplished via Central Artery ramps in the vicinity of South Station and High Street, west of the Fort Point Channel. This section of the Artery and the local streets serving it are heavily congested during peak periods.
- (2) Local street service is limited by the three bridge crossings of the Channel, Northern Avenue, Congress and Summer Streets. Each of these structures is quite old and in poor physical condition. The Northern Avenue span is subject to infrequent openings since the Channel is still a navigable waterway at this point and used by at least one commercial venture.
- (3) Only two of the three bridges (Northern Avenue and Summer Street) provide direct access to the South Boston site since Congress Street is tied to Northern Avenue and Summer Street by very indirect routes.

- (4) Heavy truck movements and on-street loading and unloading activity reduce the capacity of the arterial streets providing local access.
- (5) Circulation between the primary arterials (Northern Avenue and Summer Street) is extremely limited.
- (6) The MBTA's Red Line (Quincy-Ashmont-Harvard) serves the site via South Station and a bus connection. The station is a half mile to the west. Transit access via the Green and Orange Lines is available by a transfer at the Park and Washington Street Stations and from the Blue Line via two transfers at Government Center and Park Street.

To some extent motor vehicle access to the two sites is automatically limited by the mere fact that they are water-edge locations which under the best conditions would mean that traffic can disperse in a maximum of three directions. At the same time, of course, these sites are very accessible in terms of the water mode. In the case of the Charlestown site, this inherent motor vehicle access barrier on the waterside is compounded by the Little Mystic Channel and the Mystic River to the north, the Mystic Bridge on the west, and the Charles River to the south and west. Access to the South Boston site is constrained by Fort Point Channel and the Central Artery on the west and the railroad yards to the south of South Station, plus the commercial and residential land uses on the south (i.e. South Boston). In summary, then, it is clear that providing adequate access to both sites for more intensive land uses will require careful planning and a coordinated effort on the part of all sectors of the community since the opportunities to solve the problem are quite limited.

#### TRANSPORTATION ADVANTAGES

To keep this appraisal of the transportation characteristic in perspective, it is necessary to identify the advantages which these sites offer in terms of access and transportation services since their marketability will be strongly influenced by the City's ability to reinforce these strong points as reuse planning activities proceed. The consultant's preliminary studies suggest the following transportation advantages which the two

sites possess:

- (1) Both sites are close to the core of the metropolitan area and in spite of the restraints previously delineated, the fact remains that overall travel time to the focal point of the region's economic activity and its transportation system is quite short.
- (2) Both sites have excellent waterborne access.
- (3) Both sites have rail access.
- (4) Both sites are large enough to provide substantial amounts of on-site parking.
- (5) Both sites are close to Logan Airport.
- (6) Major transportation improvements offering opportunities to improve access to both sites have been proposed and have been under study for some time.
- (7) Both sites are centrally located in a regional sense and are thus accessible to all segments of the labor market.

#### TRANSPORTATION OBJECTIVES

Preliminary observations and analyses suggest certain transportation objectives which should be pursued to enhance the marketability of the Shipyard sites. They may be summarized as follows:

- (1) Preservation of rail access to both sites.
- (2) Definition of a short-term plan for providing auto and truck access to Gates 4 and/or 5 at the Charlestown site which minimizes community impact.
- (3) Definition of a short-term plan for providing bus access to both sites.
- (4) Encouragement of the existing proposal to rebuild the Northern Avenue Bridge (Fort Point Channel).
- (5) Initiation of the necessary engineering studies required to initiate planning for the reconstruction of the



Summer Street bridges across the Fort Point Channel and the Penn Central Railroad Right-of-Way.

- (6) Initiation of necessary engineering studies required to confirm the feasibility of the proposed South Boston Truck Route.
- (7) Initiation of necessary engineering studies to define the structural feasibility of modifying the existing Charlestown Bridge (North Washington Street) to enable removal of the center span trusses as a means of utilizing the full roadway width (6 lanes).

CHARLESTOWN

Auto-Truck

The successful meeting of the city's primary goals of "Jobs and Taxes" for the Shipyard site will result in significant increases over the existing levels in auto traffic destined to the area. However, in terms of historical trends, the amount of auto traffic which may be generated by the proposed reuse alternatives is not out of scale with previous periods of intense activity at the Shipyard. At the same time several factors combine to make careful treatment of access facilities a high priority item on the City's agenda for reuse of the Shipyard. First, while the traffic volumes generated by the Shipyard have decreased over the years to the present low levels, external traffic on the arterial highway system has increased dramatically as travel patterns have shifted to the more remote portions of the metropolitan area. Secondly, public sensitivity to traffic problems has become acute to the point that even small traffic generating facilities are treated to intense review for their impact upon residential and commercial neighborhoods. At the same time good accessibility continues to be a prime characteristic for marketing purposes. The problem of assuring good motor vehicle access should be viewed from two levels. First in importance to the city is the ability of the local/collector street system to tie the site to the regional highway system. The second facet of the overall problem is the ability of the regional system to deliver motorists to the local/collector system.

In the case of Charlestown, the regional system is now capacity restrained during peak periods and has been under study for some time. While an evaluation of the potential impact of reuse of the Shipyard on the Expressway System is beyond the scope of this project, it is obvious that intensive reuse of the Shipyard would add further weight to the justification for proceedings with traffic service improvements in the North Terminal Area. In terms of developing the Shipyard site, it is to the City's advantage to encourage the implementation of regional highway improvements in this area. On the local/collector street level, the initiative



to improve the connections to the regional highways must come directly from the city. In studying alternative collector street configurations, the consultant has attempted to focus on improvements east of the Tobin Bridge in order to keep residential encroachment of site traffic to an absolute minimum. In the consultants view, the recommended plan, which includes a new Tobin Bridge off-ramp and a new connector between Water and Chelsea Streets, provides good accessibility to the Expressway System for cars and trucks and will discourage site traffic from penetrating residential neighborhoods.

Prior to initiating further engineering/planning for the proposed improvements, the City should decide whether or not it is desirable to attempt financing them under the Federal Urban Systems Program or other appropriate Federal/State programs. Aside from cost, timing will be a most important consideration. Given the length of time it will likely take to satisfy program requirements for Urban Systems, it may be advantageous for the City to avoid Federal/State financial assistance and bear the entire cost of the street improvements. This decision, of course, will depend also upon City/State priorities and prior financial commitments.

There are other improvements, proposed in the past, which will have a beneficial affect on access to the Shipyard site. The "Topics Improvement Plans" for City and Keaney Squares and the removal of the MBTA elevated structure from the Charlestown Bridge will substantially upgrade this important link to downtown Boston, and these projects should be expedited by the city in the interest of developing the Shipyard.

#### Rail

The lack of specific and detailed development plans for the Charlestown site makes a quantitative evaluation of rail access needs impossible. Nevertheless, if industrial reuse is to be maintained as an option for the site, then rail access most certainly needs to be preserved. As part of this present work, the possibility of constructing new rail access from the north (across Little Mystic Channel) has been investigated. It is the consultant's opinion that such a plan would have to overcome a number of formidable obstacles.



Two possible choices exist for a general location for the structure - east of the Mystic River Bridge into the northerly end of the Yard and west of the Bridge with entry via Gate 5. The westerly location would involve the taking of park land on both sides of the Little Mystic Channel and to some degree it would complicate the motor vehicle access at Gate 5. The easterly location would involve some interference with the use of berthing and rail facilities along the south side of Pier 1 and would likely necessitate demolition of the woodworking shop (building 114) which is planned for reuse.

Either location will require a long skewed structure in order to tie into the existing lead track north of the channel, and the cost is likely to run at least \$3-\$5 million for a fixed span.

Given these substantial obstacles to building such a rail link, the short range plan should include preservation of rail service through Gate 1. It should be possible to maintain this rail track through the proposed National Park with little or no interference to Park visitors. The number of trains which might serve the industrial land uses would be quite small and probably could be regulated with respect to arrival and departure times. The track should be realigned, rebuilt with girder-type rail and landscaped to blend it into the surroundings. The realignment is proposed to eliminate the present Y-configuration which is awkward and limits the length of trains to 2-3 cars. Estimated cost for this improvement is \$100,000.

#### Transit

The opening of the new Haymarket North Line and the demolition of the Charlestown elevated structure will introduce the need for improved bus linkages to serve the Shipyard site as well as other portions of the Charlestown community. Estimates made as part of these studies suggest peak hour transit potential of 1050-1600 person trips (depending upon the development package).

The recommendations for specific routes to serve the site are beyond the scope of the study. However, several observations should be made:

- (1) Gate 5 (Chelsea Street) will become the main entrance to the Shipyard.
- (2) A link to the new Community College station would serve long distance work trips (to the Shipyard) best.

- (3) Residential land uses (on the site) would likely require a strong link to downtown Boston.

## SOUTH BOSTON

### Auto-Truck

The basic street network serving motor vehicle traffic at the South Boston Annex site is more efficiently structured than its counterpart in Charlestown. There are several alternate routes to the freeway systems, and even though there is considerable peak hour congestion on the Central Artery/Southeast Expressway, the arterials linking it to the site do have the capacity to absorb additional traffic. The area is not without transportation problems. The most serious ones may be summarized as follows:

- (1) South Boston is already faced with an abnormally high concentration of truck traffic, and protection of the residential neighborhoods from additional truck traffic should have high priority.
- (2) The existing bridges on Congress Street, Summer Street, and Northern Avenue are all in need of rebuilding.
- (3) The Northern Avenue access route is threatened by litigation with the Port Authority over the issue of Public Right-of-Way.

Since another access route in addition to Summer Street to the Annex is important for good circulation, the City should press its suit with the Authority. If the issue should be decided against the City, the extension of Congress to the Annex would be a logical alternative. The State Department of Public Works is well along in the planning stage for rebuilding the Northern Avenue Bridge over the Fort Point Channel. The Summer and Congress Street Bridges currently carry a load limit on them, and the City should encourage the State to begin the necessary preliminary engineering studies.

The proposed Sea Port Access Road which would follow the Penn Central Railroad tracks could provide an attractive route for south-bound traffic destined for the Southeast Expressway. This facility would also serve the other proposed developments east of the Fort Point Channel, and would likely divert some truck traffic from the South Boston street system. Preliminary engineering studies should be begun in order that the characteristics and



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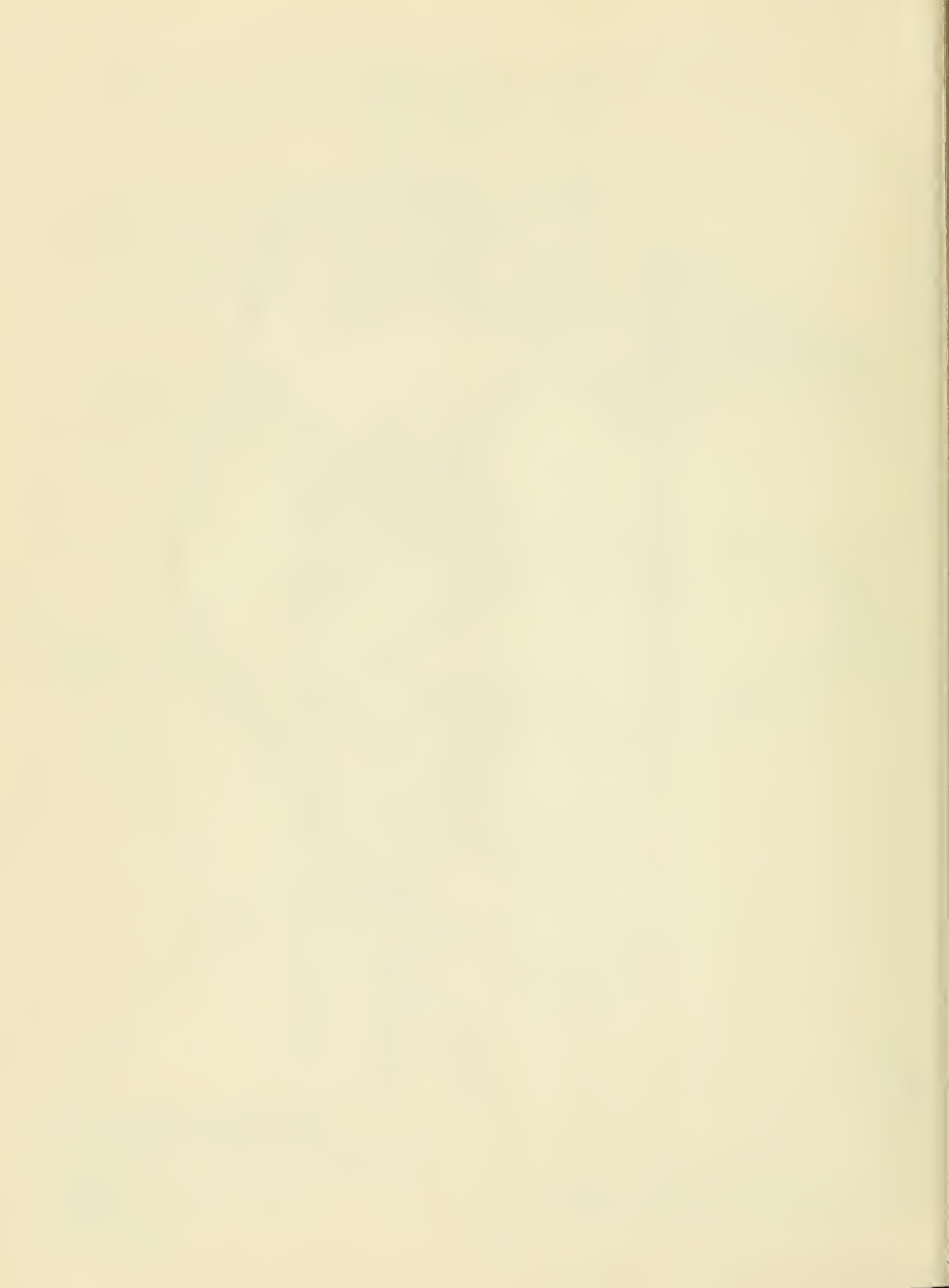
EXISTING P.M. PEAK HOUR TRAFFIC  
FIGURE IV - 2

impacts of this facility could be defined and compared with possible improvements in the corridor study as the rebuilding of Dorchester Avenue.

#### Rail

The South Boston site is presently serviced by a Penn Central lead track which follows the Penn Central Right-of-Way from the south and swings eastward through the Mass Port property between Viaduct Street and the Shipyard. No problems with rail access are anticipated at this site.





DEVELOPMENT PACKAGES  
TRANSPORTATION  
CONSIDERATIONS

As new developments in Charlestown and South Boston, the proposed reuse packages will generate additional traffic volumes on the area roadways. The capability of the street system to accommodate the additional traffic in a safe and efficient manner will be of concern to the developers and the City of Boston. In order for these developments to be a successful and integral part of their communities, the area street systems must be designed to adequately serve future traffic volumes.

This section of the report presents a detailed analysis of traffic studies made of each development package. The objectives of these studies were: (1) to evaluate the impact which traffic generated by the new developments would have upon traffic conditions in the surrounding areas; (2) to recommend site access systems capable of providing safe ingress to and egress from the developments; and (3) to recommend any external roadway improvements that may be necessary to accommodate site-generated and through (non-site) traffic volumes.

The basic elements in such an analysis include the following:

- (1) Trip-Generation Analysis. Estimates of peak-hour person-trips that would be generated by the development packages were prepared based upon the proposed site plans, traffic generation data obtained at similar developments, and detailed information concerning Boston Area travel habits.
- (2) Directions of Approach. The directions from which future trips would approach (and depart) the sites were estimated from trip tables generated from recent regional transportation studies, City of Boston Cordon Count information, and 1990 travel projections made by the Massachusetts Department of Public Works.
- (3) Transit-Auto Mode Utilization. The person-trips generated by the alternative development packages were then broken down into transit and auto modes based upon existing and expected trends in the area.

- (4) Traffic-Assignments. Site-generated traffic was assigned to the external street and freeway system serving the sites based upon the location of access points, the directional distribution and the traffic generation analyses. The site traffic was combined with non-site generated traffic in order to analyze peak conditions.
- (5) Capacity Analysis. Based upon the traffic assignments and roadway geometrics, capacity analyses were carried out to determine the adequacy of the existing roadway system.

CHARLESTOWN  
EXTERNAL ROADWAY  
IMPROVEMENTS

The traffic analysis of the various development packages proposed for the Charlestown Naval Shipyard site clearly indicated that in each case external roadway improvements are required if traffic is to operate efficiently. Three alternative roadway designs have been developed which would satisfy the projected needs. All three alternatives have two basic components in common: (1) a Water Street to Chelsea Street connection and (2) a new ramp from the Tobin Bridge to Chelsea Street.

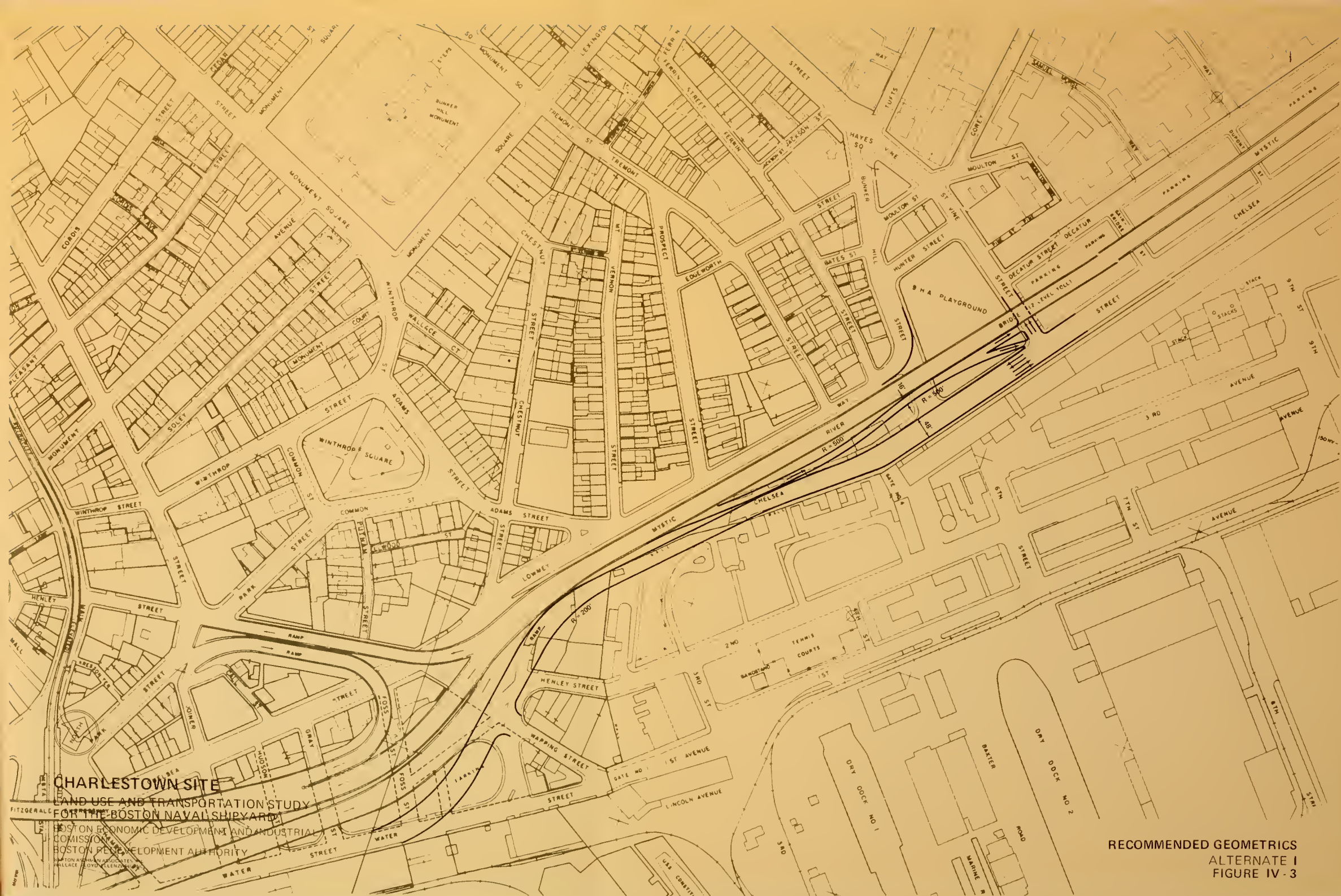
Alternative I

This design provides a two-way connection of Chelsea Street with Water Street and an at-grade off-ramp from the Tobin Bridge to Chelsea Street (See figure ). This design provides relief to Lowney Way, which our analysis indicates would otherwise be overloaded. Alternative I is the least expensive of the three proposed improvement designs. The major improvements and costs are summarized below.

Improvements

- (1) Provide "off-ramp:" from the Tobin Bridge to an at-grade intersection with Chelsea Street.
- (2) Provide a two-way connection of Water Street with Chelsea Street.
- (3) Close Bunker Hill Street between Lowney Way and Chelsea Street.
- (4) Change Bunker Hill Street to two-way operation between Lowney Way and Hayes Square.





CHARLESTOWN SITE  
LAND USE AND TRANSPORTATION STUDY  
FOR THE BOSTON NAVAL SHIPYARD  
BOSTON ECONOMIC DEVELOPMENT AND INDUSTRIAL  
COMMISSION  
BOSTON REDEVELOPMENT AUTHORITY  
BOSTON ARCHITECTURAL ASSOCIATES  
WALLACE, ROYD, GLENN, AND ASSOCIATES

RECOMMENDED GEOMETRICS  
ALTERNATE 1  
FIGURE IV-3



CHAF  
EXTE  
IMPF

# CHARLESTOWN SITE

LAND USE AND TRANSPORTATION STUDY  
FOR THE BOSTON NAVAL SHIPYARD

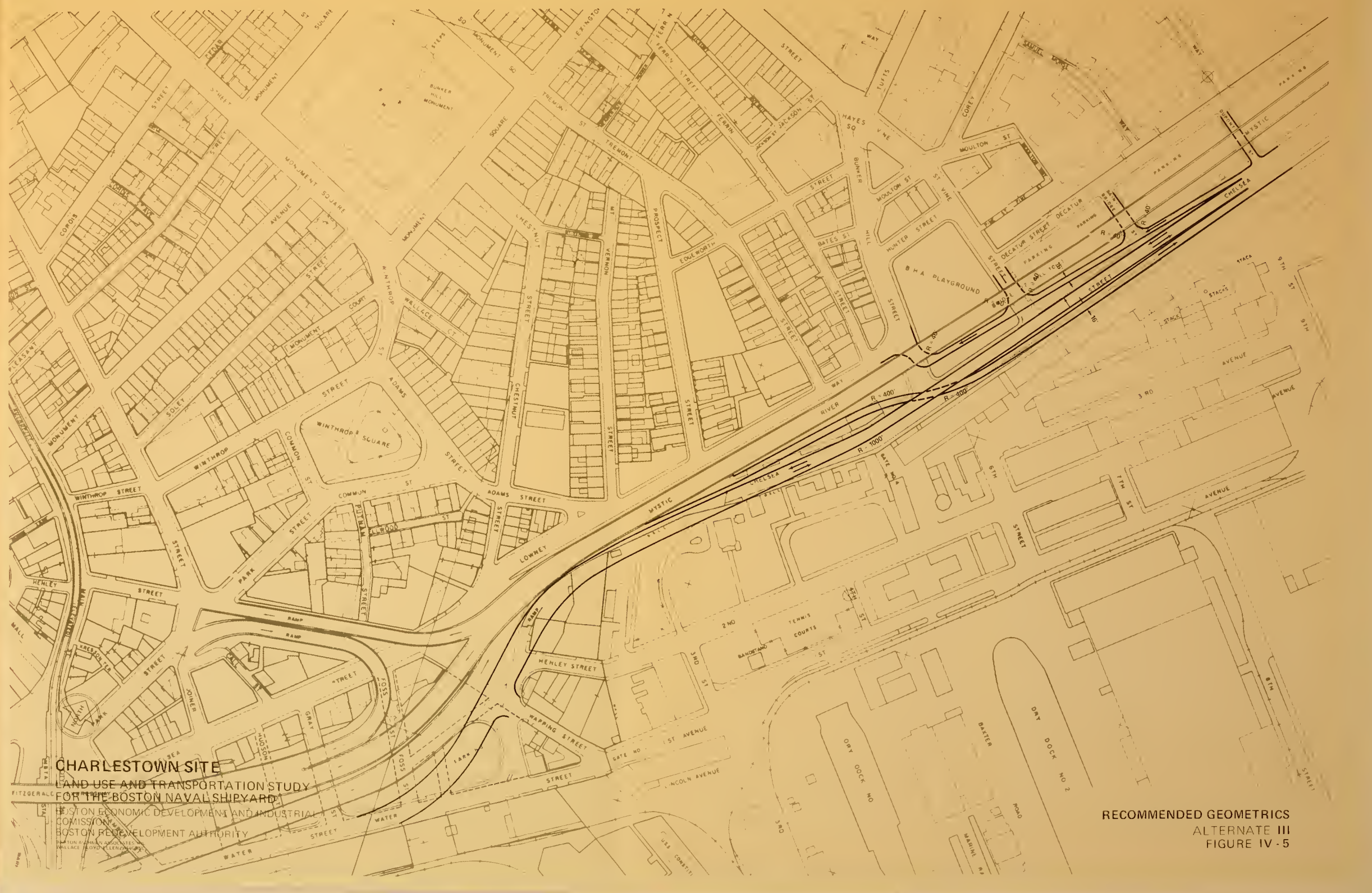
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BOSTON REDEVELOPMENT AUTHORITY

BOSTON AREA PLANNING ASSOCIATES, INC.  
PHILADELPHIA, PENNSYLVANIA

RECOMMENDED GEOMETRICS  
ALTERNATE II  
FIGURE IV - 4

CHAF  
EXTE  
IMPF





CHARLESTOWN SITE  
LAND USE AND TRANSPORTATION STUDY  
FOR THE BOSTON NAVAL SHIPYARD  
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HUTTON & HANSEN ASSOCIATES INC.  
WALLACE, BLOOM & GLASSMAN INC.

RECOMMENDED GEOMETRICS  
ALTERNATE III  
FIGURE IV - 5





- (5) Make Vine Street one-way westbound between Chelsea Street and Decatur Street.

Costs

(1)	Chelsea Street	\$ 58,000
(2)	Tobin Bridge Ramp	\$443,000
	Bridge Section	\$149,000
	Fill Section	50,000
	Roadway	41,000
	Retaining Wall	203,000
(3)	Signals	\$ 75,000
(4)	Twenty-five Percent Contingency and Fees	<u>\$144,000</u>
	Total:	<u>\$720,000</u>

Alternative II

Alternative II provides a two-way Water-Chelsea connection, as does Alternative I. This design provides for a fly-over ramp from the Tobin Bridge over Chelsea Street (See figure ). Additional ramp capacity is gained by this alternative over Alternative I due to the free flowing nature of the ramp. This alternative is the most costly of the three proposed designs.

Improvements

- (1) Provide a two-way connection of Water Street with Chelsea Street.
- (2) Provide a "fly-over" type ramp from the Tobin Bridge to Chelsea Street.
- (3) Close Bunker Hill Street between Lowney Way and Chelsea Street.
- (4) Change the operation of Bunker Hill Street between Lowney Way and Hayes Square to two-way.

### Costs

(1)	Chelsea Street	\$ 53,000
(2)	Ramp	\$1,188,000
(3)	Twenty-five Percent Contingency and Fees	<u>\$ 310,000</u>
Total:		<u>\$1,551,000</u>

### Alternative III

Alternative III provides the same two-way connection of Water Street with Chelsea Street as the previous two alternatives. Again, a new off-ramp from the Tobin Bridge to Chelsea Street is proposed. This design, however, places the ramp under an elevated section of Chelsea Street (See figure ). An additional modification is proposed in this alternative. A new one-way connection is provided to Vine Street and Lowney Way from Chelsea Street. This connection would function as a right-turn lane to Vine Street and Lowney Way. The cost of this alternative is slightly less than Alternative II, but still almost double that of Alternative I.

### Improvements

- (1) Provide a two-way connection of Water Street with Chelsea Street.
- (2) Provide an off-ramp from the Tobin Bridge which goes under an elevated section of Chelsea Street.
- (3) Provide a new link from Chelsea Street to Vine Street and Lowney Way (one-way operation southbound).

### Costs

(1)	Chelsea Street	\$ 304,000
	Right-turn Lane	\$ 50,000
	Exit Ramp	86,000
	Chelsea Street	168,000
(2)	Bridge Section	\$ 215,000
(3)	Fill Area	\$ 40,000

(4)	Retaining Wall	\$ 541,000
(5)	Twenty-five Percent Contingency and Fees	\$ 275,000
Total:		<u>\$1,375,000</u>

### Conclusions

Due to the uncertain future of the immediate environs of the Charlestown Naval Shipyard with respect to roadway improvements, it is recommended that only minimal improvements be carried out to the Tobin Bridge ramping system. Several other studies are currently underway which are examining the access needs of the Charlestown area as a whole. Therefore, Alternative I is the preferred alternative of the three proposed. This design provides for the most critical elements that will be required to serve the Shipyard area (a Water Street-Chelsea Street connection and a new off-ramp from the Tobin Bridge) within reasonable capital investment bounds and is philosophically compatible with proposed long-range improvements. The cost of Alternative I is also a very important factor--being only one-half of the cost of the other two alternatives.





CHARLESTOWN  
PACKAGE A  
INDUSTRIAL/  
INSTITUTIONAL

Generation Potential

Development package A is composed of 50 acres of industrial area and over 1,000,000 square feet of institutional space. In the afternoon peak hour almost 1,200 auto trips would be generated (60 percent by the institutional uses and 40 percent by the industrial uses). Truck traffic generated by the package would be moderately heavy with 120 trucks being generated during the afternoon peak hour. Due to the School Department facility housing a school of commerce and trade school, 1,600 transit trips to and from the site during the peak hour could be expected. This is equivalent to approximately 30 bus loads during the peak hour. Development Package A would require approximately 1,600 parking spaces. Table IV-1 gives a detailed breakdown of auto, truck, transit, and parking needs of each land-use within the total package.

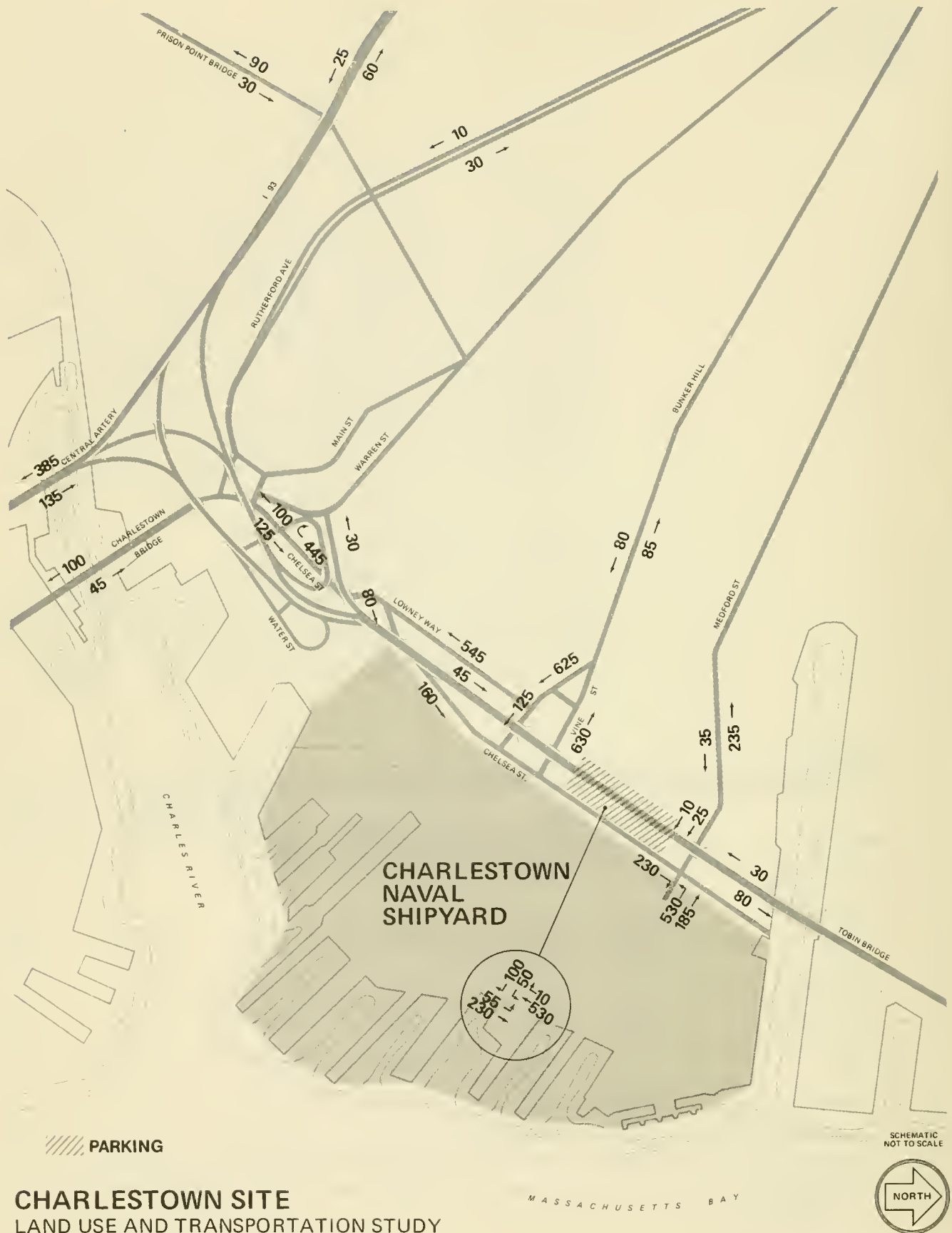
Traffic Assignment

Due to the industrial nature of this development package the trips generated will be strongly tied to the south shore area. Table IV-2 indicates the directions from which traffic would be expected to approach the site.

Table IV-1  
TRANSPORTATION DATA: A. INDUSTRIAL/INSTITUTIONAL CHARLESTOWN

Land-use	Auto Generation		Truck Generation		Transit Generation (Person Trips)		Parking Needs Spaces
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound	
<u>Institutional</u>							
Museum	25	125	3	3	15	150	250
School	55	260	5	10	150	750	480
Retail	195	170	3	4	20	15	155
Hotel	40	30	3	6	10	10	150
Office/Park							
Open Space							
National Park	60	180	2	2	60	230	400
Total <sup>(1)</sup>	220	515	15	25	210	945	955
Industry	100	350	30	60	100	340	650
Grand Total <sup>(1)</sup>	320	865	45	85	310	1,285	1,605

(1) Totals may be less than individual land-uses to a significant overlap in traffic generated by the various land-uses.



## CHARLESTOWN SITE

LAND USE AND TRANSPORTATION STUDY  
 FOR THE BOSTON NAVAL SHIPYARD

BOSTON ECONOMIC DEVELOPMENT AND INDUSTRIAL  
 COMMISSION

BOSTON REDEVELOPMENT AUTHORITY

BARTON ASCHMAN ASSOCIATES, INC.  
 WALLACE, FLOYD, ELLENZWEIG INC

**P.M. PEAK HOUR SITE TRAFFIC**  
**PACKAGE A**  
**FIGURE IV - 6**

Table IV-2  
DIRECTIONS OF APPROACH

Point of Access	Percent
Tobin Bridge	9%
Interstate 93 Rutherford	11
Prison Point Bridge	10
Charlestown Bridge	12
Storrow Drive	14
Massachusetts Pike	6
Southeast Expressway	21
CBD via Central Artery	3
Local Charlestown	14

Based upon these directions of approach and the vehicular generations developed in Table IV-1, traffic was assigned to the local arterial street system. Chelsea Street provides the main access route to the site. As Figure IV-2 illustrates, all traffic destined to the Central Artery, Prison Point Bridge, or Charlestown Bridge must proceed westbound on Chelsea Street to Lowney Way via Vine and Bunker Hill. This movement adds an additional 670 autos to the Lowney Way/Bunker Hill intersection. This means that the projected traffic volumes on Lowney Way would increase by approximately 40 percent over present volumes. The capacity of Lowney Way and especially the intersection of Lowney Way/Bunker Hill would be strained to accommodate the projected volumes. Considerable delay would be expected on Lowney Way.

A second capacity problem would be present at the Joiner Street "on-ramp" to the Central Artery. This ramp is presently functioning at near capacity, therefore, considerable entrance delay would be expected. This delay would probably encourage the use of the Charlestown Bridge to "on-ramps" in Downtown Boston.



## Conclusions

The projected volumes of this development package would tax the existing street system. Several streets (especially Lowney Way) would be operating at capacity with significant delays to be expected. Truck and bus traffic would be expected to use Lowney Way as a means of site access. This additional traffic volume on Lowney Way should be avoided through the construction of new traffic carrying capacity south of the Tobin Bridge.

Due to this projected congestion and delay as well as the encroachment by auto, truck, and bus traffic into residential neighborhoods, it is recommended that an alternative means of site access be provided. A two-way connection of Water Street with Chelsea Street would significantly benefit both the potential development at the Shipyard and the community in Charlestown. If this connection were provided, the volume of site-generated traffic expected to use Lowney Way would decrease from over 600 autos (and 100 trucks and buses) to only about 100 autos and a few trucks. This improvement (which will be common to all the development packages in Charlestown) will receive detailed description later in this section of the report.

Ramp improvements to the Central Artery, improvements to City Square, and rebuilding of sections of Charlestown Bridge would also be needed to provide a high level of service to the Charlestown Naval Shipyard. These projects are a part of the improvement of the overall transportation system composed of Interstate 93/Tobin Bridge/Central Artery/Storrow Drive. They are under detailed study elsewhere and, therefore, will not receive a detailed analysis here.

Since about 1,600 transit trips would be generated to the site during the afternoon peak, it is critical that a high level of transit service be provided. The most important linkages would be to (1) the new MBTA Orange Line, (2) Downtown Boston, and (3) within Charlestown.

In several locations one parking area was assumed to serve several uses. This is due to the fact that the demand for parking of the various uses occur at different times.

Parking for the industrial area was projected at 650 spaces which could occur within the industrial area itself (the 150 space lot is included in this total). The major parking facility (the rehabilitated building 199) will accommodate parking for the school, museum, and retail/hotel. Considerable overlap will take place between the demands of the retail and hotel and the National Park site. The three small surface lots (under Tobin Bridge) are intended for use by the National Park. These lots will accommodate the peak parking demand for the school during the winter months. Likewise, the parking structure can accommodate the peak National Park demand during the summer months (when school demand is low).

#### Internal Roadway System

Package A will require a four-lane entrance area. This could be composed of two two-lane (24 feet) sections and a median strip (8-10 feet). This cross section could narrow east of the parking structure to 32 feet in width. This would provide for two moving lanes and one parking lane. This cross section should extend through the institutional area. The roadways providing access to the 75 car parking area should be 24 feet wide (two-lanes).

Development package A results in the lowest internal cost for transportation improvements of the three Charlestown packages. Internal improvements to accommodate this package could be well over \$3 million. Table IV-3 summarizes these internal cost projections.

Table IV-3

#### PACKAGE A - INTERNAL TRANSPORTATION IMPROVEMENTS COST

Element	Cost
Parking	
150 Surface Spaces	\$ 105,000
Rehabilitation Building 199	2,184,000
Roadways	
Surfacing	\$ 96,000
Curb, sidewalks, lighting	144,000
Rebuild Rail Line	60,000
25 Percent Contingency and Fees	\$ 647,000
Total:	<u>\$3,236,000</u>



CHARLESTOWN  
PACKAGE B  
HOUSING/INDUSTRIAL/  
INSTITUTIONAL

Generation Potential

Development Package B is composed of 28 acres of industrial area, over 1 million square feet of institutional space, 500 housing units and a hotel and commercial space. Over 1,600 auto trips would be generated in the afternoon peak-hour (30 percent by the institutional uses, 10 percent by the industrial uses, and 60 percent by the commercial and housing uses). Truck traffic would be fairly heavy, with approximately 140 trucks being generated during the afternoon peak hour. Heavy dependence upon public transportation by the institutional land-uses and the housing would result in over 1,000 person-trips using transit (20 buses). Development Package B would require approximately 2,300 parking spaces. Table IV-4 summarizes auto, transit, truck, and parking demands for each land-use within the total package.

Traffic Assignment

Package B has a very similar direction of approach to Package A with slightly fewer trips destined to the South Shore and more to downtown Boston. Table IV-5 summarizes the directions from which traffic would be expected to approach the site.

Table IV-4  
TRANSPORTATION DATA: B. HOUSING/INDUSTRIAL/INSTITUTIONAL-CHARLESTOWN

Land-use	Auto Generation		Truck Generation		Transit Generation (Person Trips)		Parking Need
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound	
Institutional							
College	60	270	5	5	100	250	500
College Housing	Included	Above					
Museum	25	125	3	3	15	150	250
Open Space							
National Park	60	180	2	2	60	230	400
Office							
Total (1)	105	425	10	10	135	500	825
Commercial and Housing							
Housing	100	20	3	8	165	30	600
Retail	645	570	4	6	100	100	535
Marine	75	75	2	2	--	--	150
Hotel (1)	80	60	3	6	20	15	300
Total	535	395	12	22	170	100	1,290
Industry	40	135	30	60	35	115	225
Grand Total (1)	680	955	52	92	340	715	2,340

(1) Totals will be smaller than individual generations due to a very significant overlap of generation by the various land-uses.





Table IV-5  
DIRECTIONS OF APPROACH

Point of Access	Percent
Tobin Bridge	9%
Interstate 93/Rutherford	10
Prison Point Bridge	9
Charlestown Bridge	16
Storrow Drive	14
Massachusetts Pike	6
Southeast Expressway	17
CBD via Central Artery	4
Local Charlestown	15

Based upon these directions of approach and the traffic generation analysis, traffic was assigned to the existing local street system. Again, Lowney Way becomes the most critical link in the system. Development package B would generate an additional 800 autos and over 100 trucks and buses that would desire to use Lowney Way (See Figure IV-3). This additional traffic would double the present traffic flow on Lowney Way. At this point, Lowney Way and the Lowney Way/Bunker Hill intersection would completely breakdown and would be over-capacity. Traffic would, therefore, find alternative routes through Charlestown. This would result in significant penetration of traffic through residential areas. While it appears that package A traffic would saturate Lowney Way, package B would generate too much traffic to be accommodated.

Again the problem of the inadequate ramping system to and from the Central Artery will present traffic delay and restricted movement opportunities.

#### Conclusions

The 1,600 autos and 160 trucks and buses estimated to be generated by this development

package would cause significant residential neighborhood penetration by through traffic and severe congestion on Lowney Way. This would be inconsistent with the residential character of Charlestown and should be avoided.

The two-way connection of Water Street with Chelsea Street again becomes the key to successful traffic planning in the area. This connection could reduce site auto traffic on Lowney Way by some 600 autos in the peak hour alone. The Tobin Bridge would function as a buffer area between the heavy traffic on the new connection and the residential areas in Charlestown. Again, as freeway plans are formalized they should include the need to improve access to Charlestown and the Shipyard site.

Adequate public transportation service to the site is an element in the required transportation program. It would be essential to tie the site to the new MBTA rapid transit station and to downtown Boston by bus routes. As the tables summarizing transportation needs by land-use illustrate, the use of public transportation is a major element in reducing the need for auto access. If adequate public transportation to the site is not maintained, the demand for auto access will increase sharply. The 1,000 transit trips to and from the site during the peak hour represent over 600 auto trips.

Building 149 can be converted into a parking facility for 800 autos. This facility would provide adequate parking for the college, the museums and for the National Park during the summer months. The new 450 auto parking structure would serve all of the needs of the hotel center and would accommodate up to 150 autos for the retail/restaurant land uses. The remaining demand of the retail uses could be accommodated by the two smaller surface lots (50 and 100 autos). Marina parking can be accommodated in the 100 space lot on the pier with overflow parking in the 200 space lot near the industrial area.

#### Internal Roadway System

It would be desirable to provide two entrances for this development package. The major entrance should be near the major parking facility (Building 149). This roadway should

be a four-lane section for the first few hundred feet (to the parking structure entrance). The main circulation roadway should be 32 feet wide. (Two moving lanes and one parking lane.) The circulation roadway around the housing should be a two-lane facility (24 feet).

Due to additional parking requirements and the need to rebuild a larger section of rail track, the internal cost for transportation improvements is estimated to be over \$7,000,000. Table IV-6 summarizes the cost of the needed improvements.

Table IV-6  
PACKAGE B-INTERNAL TRANSPORTATION IMPROVEMENTS  
COST

Element	Cost
Parking	
500 Surface Spaces	\$ 350,000
Rehabilitation Building 149	2,760,000
New Structure	2,025,000
Roadways	
Surfacing	55,000
Curb, Sidewalk, Lighting	253,000
Rebuild Rail Line	260,000
25 Percent Contingency and Fees	<u>\$1,428,000</u>
Total:	<u><u>\$7,131,000</u></u>





CHARLESTOWN  
PACKAGE C  
HOTEL/CONVENTION/  
HOUSING/INSTITUTIONAL

Generation Potential

Development package C is composed of over one million square feet of institutional space; a 1,000-room hotel, convention facilities, and commercial area; and 1,000 units of housing. Approximately 2,000 auto trips, 80 truck trips, and 1,150 transit trips (29 buses) will be generated by the proposed development during the afternoon peak hour of traffic flow. This package generates the greatest transportation demands of the three packages evaluated for Charlestown. It generates almost 70 percent more vehicular trips than package A and 25 percent more trips than package B. Over 3,100 parking spaces will be required. Table IV-7 summarizes the traffic generated by each of the land-uses with package C.

Traffic Assignment

Development package C is very heavily oriented to downtown Boston and fewer trips oriented to the South Shore than either package A or B. Table IV-8 summarizes the directions from which traffic would be expected to approach the site.

Table IV-7

TRANSPORTATION DATA: C. HOTEL/CONVENTION/HOUSING/INSTITUTIONAL - CHARLESTOWN

Land-use	Auto Generation		Truck Generation		Transit Generation (Person Trips)		Parking Need
	Inbound	Outbound	Inbound	Outbound	Inbound	Outbound	
Institutional							
College	60	270	5	5	100	250	500
College Housing	Included	Above					
Museum	25	125	3	3	15	150	250
Open Space							
Loft/Office							
National Park	60	180	2	2	60	230	400
Total	105	425	10	10	135	500	825
Hotel/Convention							
Retail	645	570	4	6	100	100	535
Hotel	200	40	5	15	5	15	600
Convention	110	370	5	5	5	5	250
Marina	75	75	--	--	--	--	150
Total	600	645	14	26	60	70	1,085
Housing	200	40	6	15	330	60	1,200
Grand Total	905	1,110	30	51	525	630	3,110

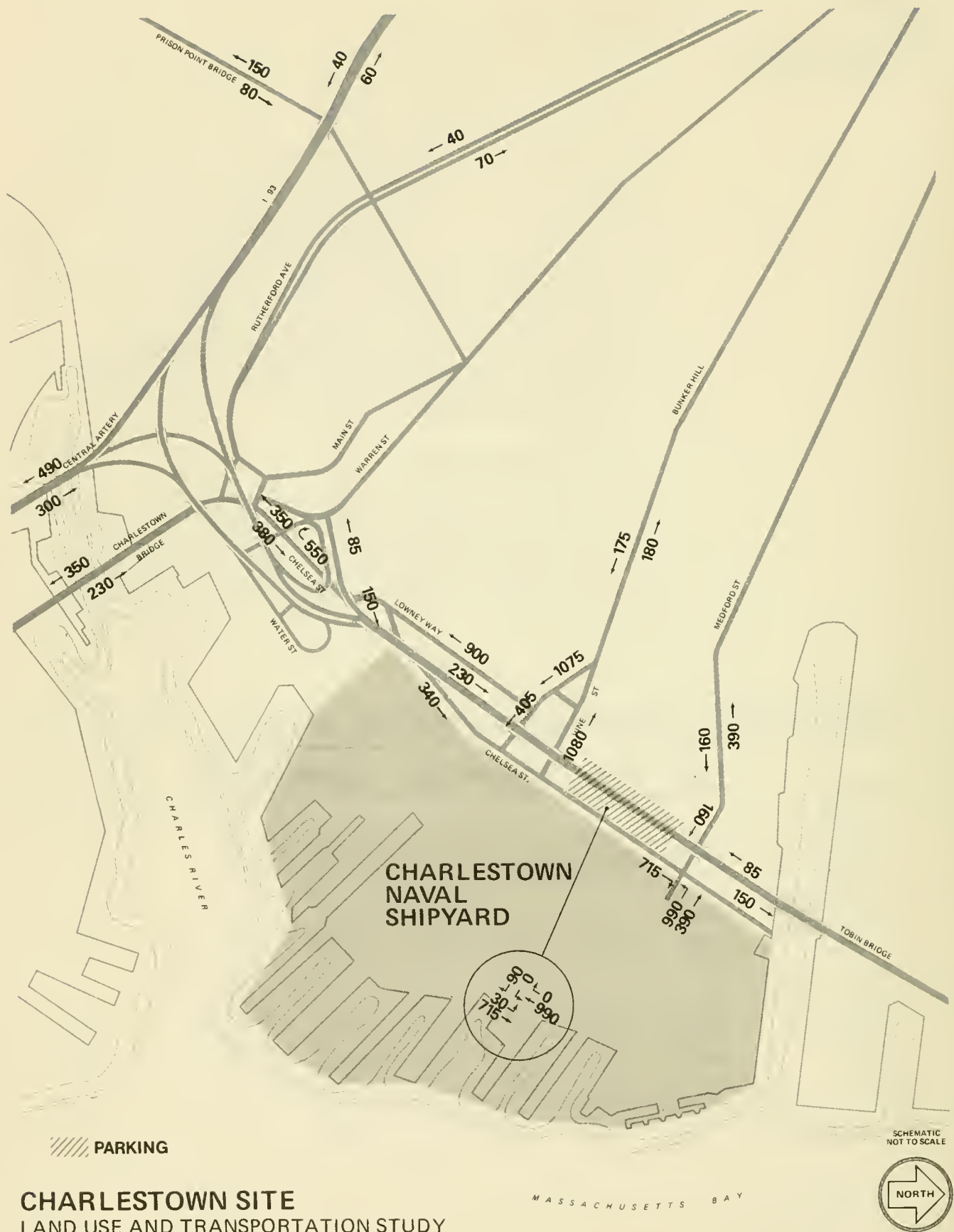


Table IV-8  
DIRECTIONS OF APPROACH

Point of Access	Percent
Tobin Bridge	10%
Interstate 93/Rutherford	10
Prison Point Bridge	10
Charlestown Bridge	21
Storrow Drive	10
Massachusetts Pike	4
Southeast Expressway	14
CBD via Central Artery	8
Local Charlestown	15

Based upon the above directions of approach and generation values from Table IV-7, traffic was assigned to the area street system (see Figure IV-4). Over 1,100 vehicles were assigned to Lowney Way. Site-generated traffic alone would utilize most of the capacity of Lowney Way and of the Lowney Way/Bunker Hill intersection. The 1,100 site-generated vehicles is 140 percent of the present traffic flow on this street. Several hundred autos would be forced to choose alternative routes through Charlestown. A Water Street/Chelsea Street connection would be essential to the successful operation of this development package. Even with such a connection almost 450 new vehicles could be expected to use Lowney Way which would mean that both a new Water/Chelsea connection and existing Lowney Way would be operating at near capacity during peak periods. Given that no additional roadway improvements are made (other than a Chelsea/Water connection), Development Package C seems to be about the maximum development that could be undertaken without causing serious problems with traffic movement.

The traffic volumes generated by this development package are great enough to require improvements to the freeway systems if site traffic is to be accommodated at



a reasonable level of service. Significant delays could be expected in the use of the freeway ramping system during the peak periods in the morning and the afternoon.

### Conclusions

The 2,000 autos and 100 trucks and buses that will be generated by Development Package C will cause both Lowney Way and the proposed Water Street/Chelsea Street connection to operate at capacity. Very little additional development could then take place in the area without further improving the roadway system. Therefore, this alternative would not be feasible from a traffic engineering point of view without providing two new lanes of access. The Water Street/Chelsea Street connection appears to be the most efficient way to obtain the required capacity without violating the neighborhoods surrounding the site.

Direct transit access to the new MBTA station and to downtown Boston would be key elements in making this a viable development option.

Parking for the college, museums and National Park overflow will be provided by the conversion of building 199 into an 800 space parking facility. During the summer when National Park parking demand is high, the college demand will be low, with the reverse being true for the winter months. The demands of the hotel, convention center, and retail/restaurant land uses will be accommodated by the new 960 space parking structure. Considerable overlap of demand exists between these uses and therefore a common parking location results in the need for fewer total parking spaces.

### Internal Roadway System

This alternative should be provided with two entrances. The major entrance should be located near building 199 (converted into a parking structure). This entrance should be a four-lane (48 feet) cross section from the entry point past the parking structure. The remainder of the primary circulation roadway should be 32 feet in width (two movement lanes and one parking lane). Near the entrance of the new parking structure, the roadway should be widened to 36

feet to provide for a left-turn lane into the structure itself. The circulation roadway around the hotel and convention center should be two lanes (24 feet) in width.

This package is the most costly to accommodate from a point of view of transportation site improvements. Improvements could be expected to cost approximately \$7.3 million. Table IV-9 summarizes the costs.

Table IV-9  
PACKAGE C-INTERNAL TRANSPORTATION IMPROVEMENTS  
COST

Element	Cost
Parking	
250 Surface Spaces	\$ 175,000
Rehabilitation Building 199	1,092,000
New Parking Structure	4,320,000
Roadways	
Surfacing	\$ 40,000
Curb, Sidewalk, Lighting	217,000
25 Percent Contingency and Fees	<u>\$1,461,000</u>
Total:	<u>\$7,305,000</u>

## SOUTH BOSTON

The South Boston Naval Annex is readily accessible from all parts of Boston. Arterial Street access from Summer Street and Northern Avenue is possible from the following elements of the freeway system:

- (1) Central Artery - north
- (2) I-93 (via Central Artery) - northwest
- (3) Tobin Bridge (via Central Artery) - north
- (4) Massachusetts Turnpike - west
- (5) Storrow Drive (via Central Artery) - west
- (6) Southeast Expressway - south/southeast

Summer Street provides the main arterial access route to the site. This roadway has a four-lane cross-section which is 69 feet wide (including median) to the west of the site, and 56 feet wide to the east of the site. This roadway has the basic capacity to move between 2,500 and 3,000 vehicles per hour (both directions). The present peak hour demand is approximately 1,000 vehicles. Therefore, this street has a significant reserve capacity.

Northern Avenue is presently of limited use for site access due to the inadequate bridge structure over Fort Point Channel. A new bridge is being planned for Northern Avenue which will significantly increase its desirability as a secondary access point. Figure IV-5 illustrates existing traffic volumes in South Boston.

SOUTH BOSTON  
PACKAGE A  
INDUSTRIAL PARK

Generation Potential

Development Package A is composed of 65 acres of industrial park and 13 acres of a dry dock facility. Approximately 1.4 million square feet of industrial land-uses will be generated by this alternative. In the afternoon peak hour almost 950 auto trips are estimated to be generated by the proposed development package. Truck traffic would be moderate, about 75 trucks moving into and out of the site during the peak hour. Approximately 750 person trips (15 loaded buses) would be generated by the development during this peak period. This development package would require approximately 1,500 parking spaces. Parking could be accommodated on surface lots throughout the site, but would require 10 to 12 acres of land. Table IV-11 gives a detailed breakdown of auto, truck, transit, and parking needs of this development package.

Traffic Assignment

Due to the industrial nature of this development package, future trips will be strongly tied to the South Shore area. Table IV-12 indicates the directions from which traffic would be expected to approach the site.

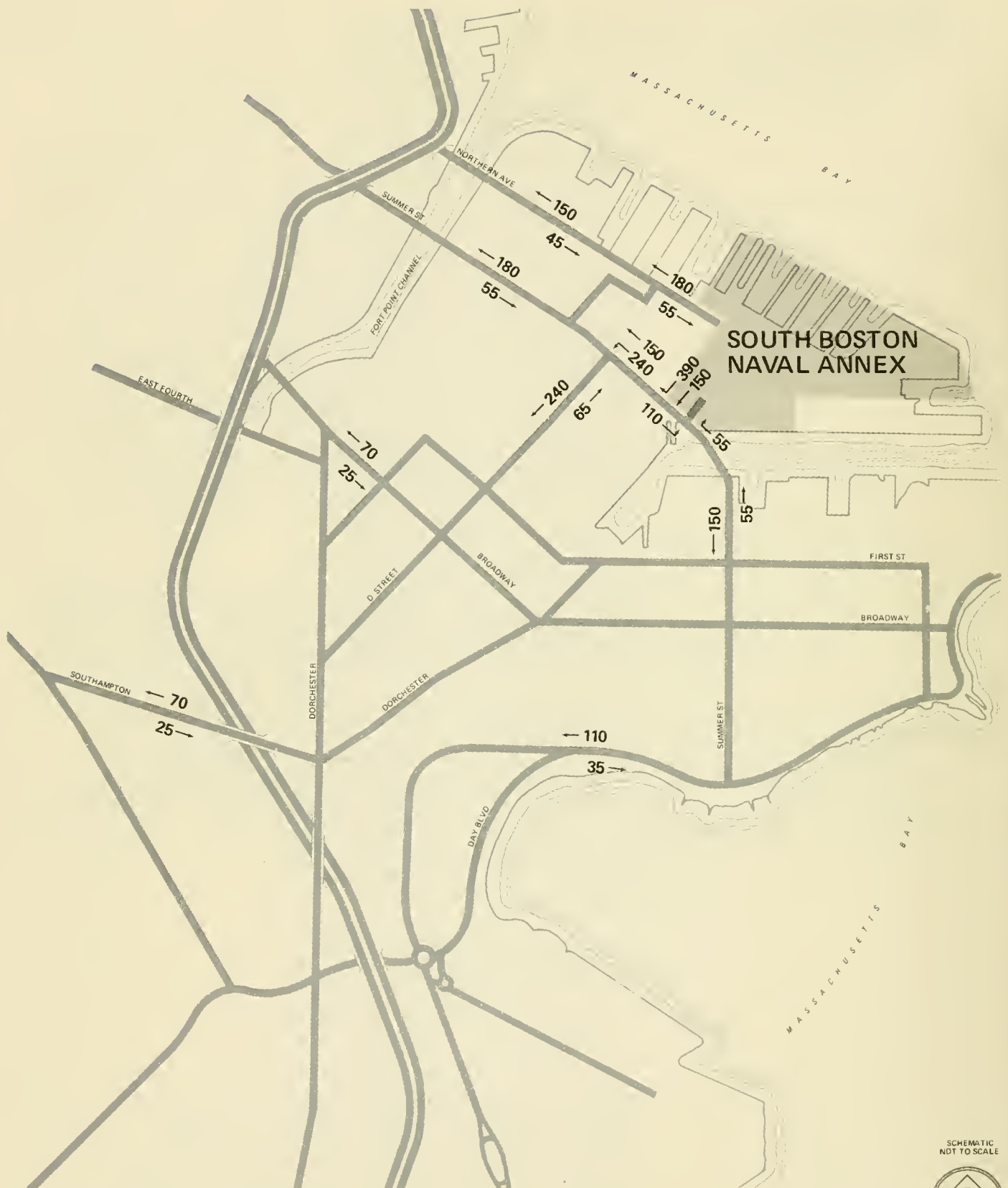
Table IV-11

TRANSPORTATION DATA: A. INDUSTRIAL PARK  
SOUTH BOSTON

	Inbound	Outbound
Auto Generation	220	720
Truck Generation	25	50
Transit Generation (person Trips)	170	575
Parking Needs	1,500 spaces	

Based upon these directions of approach and the vehicular generations developed in Table IV-11, traffic was assigned to the local arterial street system. Summer Street provides the main access route to the site. As Figure IV-6 indicates, the auto traffic assigned to the area street system is well





## SOUTH BOSTON ANNEX

### LAND USE AND TRANSPORTATION STUDY FOR THE BOSTON NAVAL SHIPYARD

BOSTON ECONOMIC DEVELOPMENT AND INDUSTRIAL  
COMMISSION  
BOSTON REDEVELOPMENT AUTHORITY

BARTON ASCHMAN ASSOCIATES, INC.  
WALLACE, FLOYD, ELLENZWEIG INC.

P.M. PEAK HOUR SITE TRAFFIC  
PACKAGE A  
FIGURE IV - 9

SCHEMATIC  
NOT TO SCALE



Table IV-12  
DIRECTIONS OF APPROACH

<u>Point Of Access</u>	<u>Percent</u>
Northern Avenue Bridge	20%
Summer Street Bridge	25
Broadway/Fourth Street Bridges	10
Southampton Street	10
William J. Day Boulevard	15
Within South Boston	20

within the capacity of the existing system. The heaviest traffic input would be along Summer Street, where some minor operational improvements may be required to maintain adequate traffic operations. It may be necessary to signalize the Summer Street entrance to the proposed development to assure adequate site access during the peak hours.

### Conclusions

The projected transportation demands of this development package would appear to be compatible with the existing conditions in South Boston. Summer Street appears to have adequate reserve capacity to accommodate all site-generated traffic. In spite of this fact, it will be highly desirable to maintain a second access point at Northern Avenue. The volume of traffic projected to use Northern Avenue is relatively low (235 autos in the peak hour) and appears to be compatible with existing land-uses in the area. Northern Avenue also plays an important role in providing access to a proposed truck route in South Boston along the New York/New Haven and Hartford Railway Right-of-Way.

Since almost 750 people are expected to use public transportation during the peak hour, it is critical that a high level of service be maintained. The most important linkages would be to (1) South Station Rapid Transit and (2) local South Boston bus.

### Internal Roadway System

Package A should be provided with a basic two-lane internal roadway system. The Summer Street entrance should be provided with a four-lane section (48 feet) to provide for easy turning movements into and out of the site (two lanes in each direction). This four-lane section should be carried into the site for 300 to 350 feet (or to the first interior roadway).

Internal cost estimates were prepared for the South Boston development packages assuming that one-half of the interior roadways would be resurfaced and lighting provided. It was also assumed that a new roadway would have to be provided around the waterfront area. Under these assumptions, Development Package A would require about \$700,000 worth of internal improvements. Table IV-13 provides the cost estimates.

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Table IV-13  
PACKAGE A- INTERNAL TRANSPORTATION IMPROVEMENTS  
COST

---

Element	Cost
Surfacing	\$ 70,000
Rebuilding Waterfront Roadway	\$ 132,000
Lighting	\$ 377,000
25 Percent Contingency and Fees	<u>\$ 144,000</u>
Total:	<u>\$ 723,000</u>

---

PACKAGE B  
CONTAINER PORT/  
INDUSTRIAL PARK

Generation Potential

Development Package B is composed of 40 acres of industrial land, 24 acres of a container handling facility, and 13 acres of dry dock facility. Almost 1,300 auto trips would be generated during the afternoon peak hour (60 percent by the industrial park, 20 percent by the container port, and 20 percent by the dry dock facility). Truck traffic would be heavy with almost 180 trucks being generated during the peak hour (125 of these from the container port). This package would result in almost 750 person-trips using transit (15 buses). Parking demand would be slightly greater for package B than package A, with 1,800 parking spaces being required. If all of the spaces were provided in surface lots, some 12 to 14 acres would be required. Table IV-14 summarizes auto, transit, truck, and parking demands for each land-use within the total package.

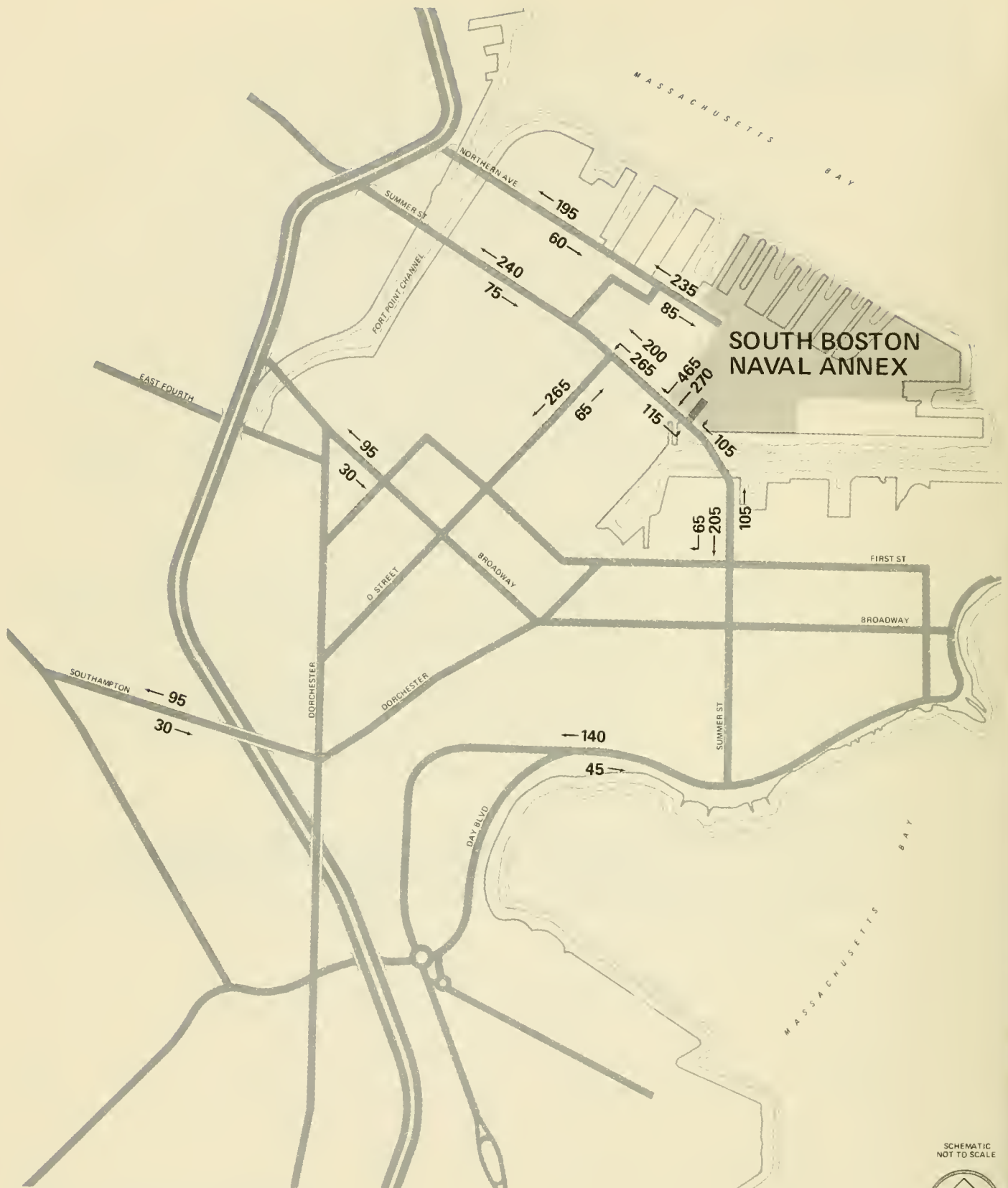
Traffic Assignment

Package B had a similar direction of approach to package A. The land-uses in both packages were totally industrial in nature and were therefore assumed to have similar origin-destination patterns. Based upon the directions of approach from Table IV-12 and the generations from Table IV-14, traffic was assigned to the existing street system.

Table IV-14  
TRANSPORTATION DATA: B. CONTAINER PORT/INDUSTRIAL PARK--SOUTH BOSTON

Land use	<u>Auto Generation</u>		<u>Truck Generation</u>		<u>(Person Trips) Transit Generation</u>		Parking Needs
	<u>In</u>	<u>Out</u>	<u>In</u>	<u>Out</u>	<u>In</u>	<u>Out</u>	
Container Port	50	200	45	70	20	55	300
Dry Dock	80	180	5	5	20	55	250
Industry	<u>175</u>	<u>590</u>	<u>25</u>	<u>40</u>	<u>135</u>	<u>450</u>	<u>1,260</u>
Total	305	970	75	115	175	560	1,810





SCHEMATIC  
NOT TO SCALE



## SOUTH BOSTON ANNEX

LAND USE AND TRANSPORTATION STUDY  
FOR THE BOSTON NAVAL SHIPYARD

BOSTON ECONOMIC DEVELOPMENT AND INDUSTRIAL  
COMMISSION

BOSTON REDEVELOPMENT AUTHORITY

BARTON-ASCHMAN ASSOCIATES, INC.  
WALLACE, FLOYD, ELLENZWEIG INC.

P.M. PEAK HOUR SITE TRAFFIC

PACKAGE B

FIGURE IV - 10

Table IV-12  
DIRECTIONS OF APPROACH

Point of Access	Percent
Northern Avenue Bridge	20%
Summer Street Bridge	25
Broadway/Fourth Street Bridges	10
Southampton Street	10
William J. Day Boulevard	15
Within South Boston	20

Package B would generate an additional 600 auto trips that would desire to use Summer Street between the entrance and D Street (See Figure IV-7). This represents the heaviest link of site-generated traffic. This additional traffic can be accommodated quite well by the existing street system. As with Development Package A, minor operational improvements along Summer Street and signalization of the Summer Street entrance may be required to assume adequate site access during the peak hours.

#### Conclusions

The existing South Boston street system appears to have adequate reserve capacity to accommodate all site-generated traffic. Northern Avenue again plays an important role in site development. Since this development package generates a heavy volume of truck traffic, the Northern Avenue link to the proposed South Boston truck route would be especially helpful.

As with package A, adequate public transportation must be maintained. The important linkages are to (1) South Station Rapid Transit and (2) local South Boston buses.

#### Internal Roadway System

As with package A, the basic internal roadway system should be a two-lane (24 feet) roadway.

The Summer Street entrance should be widened to a four-lane roadway (48 feet) for the ease of turning movements into and out of the site. This four-lane cross-section should be carried into the site for approximately 300 to 350 feet (or the first interior roadway). The Northern Avenue entrance would function adequately as a two-lane cross-section.

Internal cost estimates were proposed in the same manner as for package A, assuming that one-half of the existing roadways would have to be resurfaced, the waterfront roadway to be rebuilt and all new lighting to be provided. Table IV-15 provides a summary of internal costs.

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Table IV-15  
PACKAGE B-INTERNAL TRANSPORTATION IMPROVEMENTS  
COST

---

Element	Cost
Resurfacing	\$ 70,000
Rebuilding Waterfront Roadway	\$ 132,000
Lighting	\$ 377,000
25 Percent Contingency and Fees	\$ 144,000
Total:	<u>\$ 723,000</u>

---

SHIPBUILDING  
SOUTH BOSTON

A traffic analysis was conducted to determine the traffic generating potential of a shipbuilding development package although land-use planning for such an alternative was not a part of the study. It was assumed that a shipbuilding package would employ 3,900 people. On the basis of this estimate and other available material, Table IV-16 was developed showing total generation potential.

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Table IV-16  
TRANSPORTATION DATA: SHIPBUILDING-SOUTH BOSTON

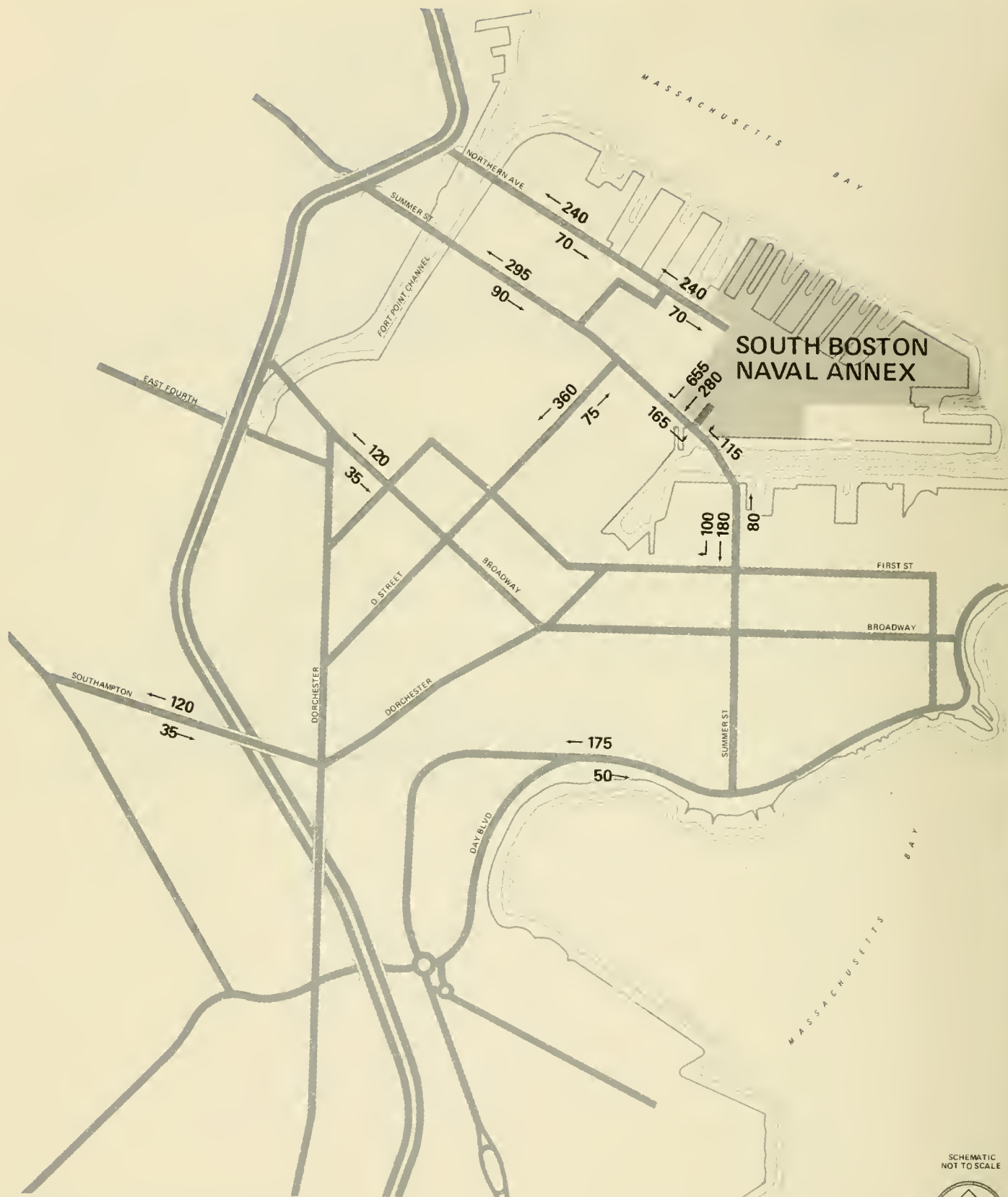
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	Inbound	Outbound
Auto Generation	350	1,175
Truck Generation	30	60
Transit Generation (Person Trips)	275	940
Parking Needs	2,700 spaces	

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Figure IV-8 illustrates the above traffic assigned to area roadways. These volumes, while the highest of the alternatives proposed for South Boston, could be accommodated on the existing roadway system.





# **SOUTH BOSTON ANNEX** **LAND USE AND TRANSPORTATION STUDY** **FOR THE BOSTON NAVAL SHIPYARD**

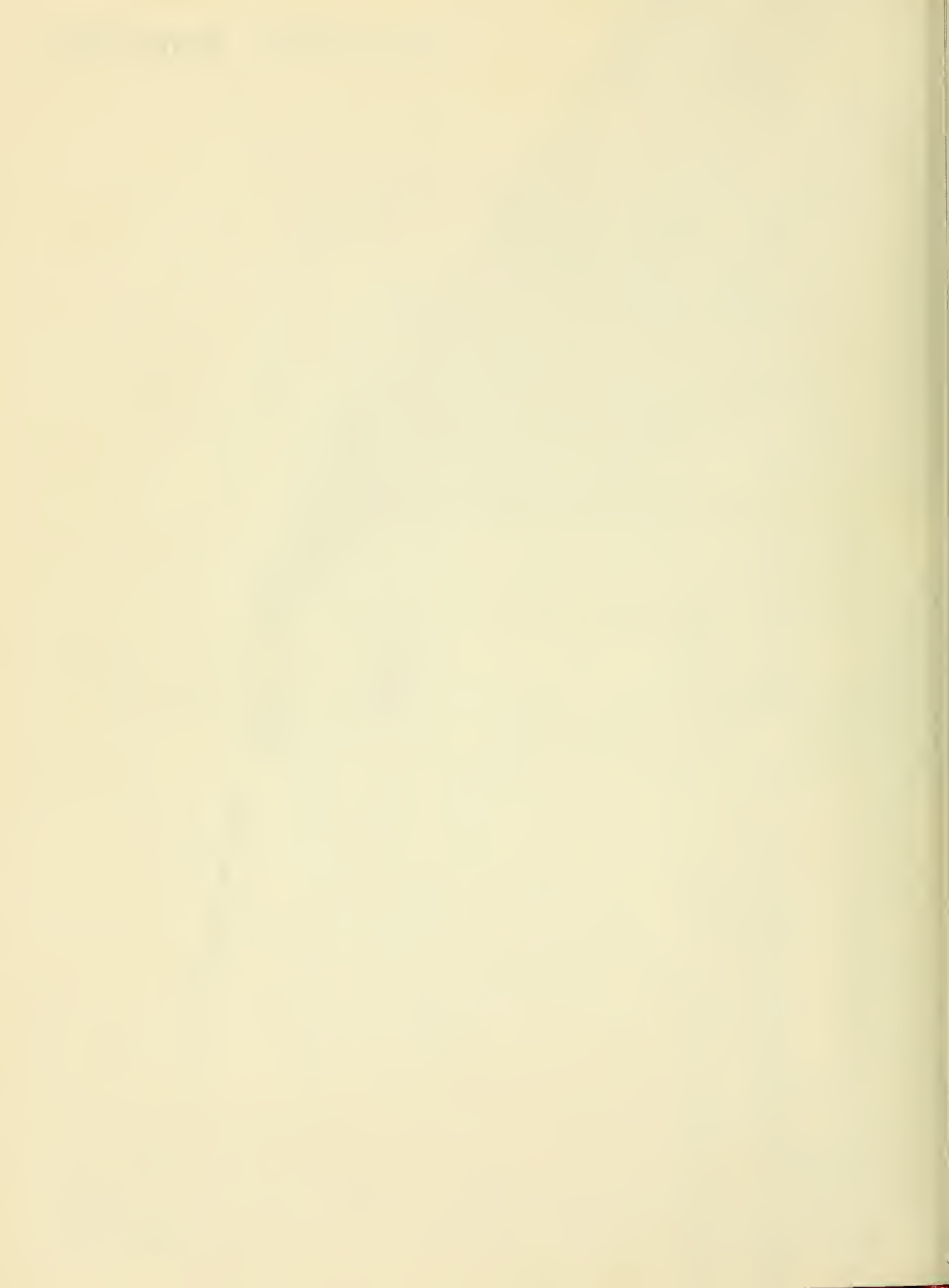
BOSTON ECONOMIC DEVELOPMENT AND INDUSTRIAL  
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 BOSTON REDEVELOPMENT AUTHORITY

BARTON ASCHMAN ASSOCIATES, INC.  
 WALLACE, FLOYD, ELLENZWEIG INC

**P.M. PEAK HOUR SITE TRAFFIC**  
**SHIPBUILDING**  
**FIGURE IV - 11**

# ECONOMIC ANALYSIS





## INTRODUCTION

This report section presents the basic findings and conclusions from the analysis of the marketability, fiscal impact, and financial attractiveness of the various development packages. The initial segment reviews the basic findings from the previous Phase I report dealing with general market trends for various land uses in Boston. Next, a synopsis of some of the most relevant findings on the fiscal and economic impact of the various packages is presented. Finally, each development alternative is analyzed in terms of its development concept, compatibility of land uses, marketability and phasing, revenues and expenses at completion and over the life of the project, economic impact through the multiplier effect, and site preparation costs to the City. Supporting documentation of research findings, data sources and methods, and the derivation of the conclusions presented here are found in the Appendix B of this report.

## SUMMARY OF PREVIOUS MARKET FINDINGS

The initial phase of this assignment focused on the overall market strength of the various potential land uses for redevelopment of the Boston Naval Shipyards.

The following presents a brief summary of the major market findings arrived at through this analysis. It should be emphasized that each use was analyzed on the basis of its own competitive strength within existing and projected markets. Neither the impact of multiple uses on each other nor the likely absorption levels of uses which differ from established land use patterns are explored. A more detailed analysis and explanation of the points covered below can be found in the Phase I report.

### Residential Market

There is an estimated market for over 53,000 dwelling units in the City of Boston between 1972 and 1985. Of this total, approximately 3,700 units could be absorbed in Charlestown. The units in Charlestown represent approximately 180 new units per year and 80 replacement units annually.

### Retail Market

The total demand for retail space to serve the Charlestown local market is approximately 175,000 square feet. If plans already under way for new shopping facilities in Charlestown are realized, the amount of local market retail space that



could be absorbed is under 100,000 square feet. While more detailed analysis is warranted, there appears to be a market for approximately 75,000 to 100,000 square feet of specialty shopping space at Charlestown.

#### Office Market

Absorption of office space has been good in Boston, even with large amounts of space coming on the market in recent years. While there is a demand for an additional supply of 20 million square feet of office space in Boston by 1985 based on projected employment levels, projects currently in various stages of planning will capture most of that demand.

#### Transient Housing Market

The demand for hotel/motel rooms is strong in Boston, even without the temporary inflation of demand that will be caused by the Bicentennial Celebration. Consistent with this demand, there are numerous projects in some state of development or planning. There is a demand for 200-250 hotel/motel rooms at the Charlestown site, based upon projected visitation to the National Park.

#### Industrial Market

The market for industrial space in Boston has not been strong in recent years. Preliminary analysis indicates that the City might absorb 8.5 million Sq.Ft. of industrial space by 1985 based on employment projections. This figure represents an average annual increase in space of 650,000 square feet. It should be noted, however, that this figure is based on target projections, and represent an increase over current industrial absorption and construction levels of 240,000 square feet annually.

The results of a review of the market for various land uses indicate that, with the exception of shipbuilding, no single use will be able to occupy the large amount of square footage of space available, unless a major integrated re-use plan is developed. The scale of development has to be large enough to create its own environment and market dynamics. Both the Charlestown and South Boston sites are in competition with other large sites in the central part of the Boston region and will have to be planned for major development as a package.

Depending on the development packages assembled, there would be competition for uses between the Charlestown and South Boston sites, and this factor should be given careful consideration in planning and developing the two sites.

Based on this analysis, several development alternatives for the two sites were selected for detailed evaluation. Some of these alternatives envision the changing of land use patterns and the creation over time of new market values from redevelopment. A summary of the detailed analysis of the five alternatives is provided in the following paragraphs.

#### SUMMARY EVALUATION OF DEVELOPMENT ALTERNATIVES

The five development alternatives were analyzed in depth to determine their absolute and relative merits. Particular attention was given to the extent to which the development programs fulfill the City's goals of providing employment opportunities for its citizens and also generating tax benefits for the community. The probable marketability of each alternative was also assessed. For major new construction and reuse elements, a preliminary financial analysis was produced to test the attractiveness of the concept for private development. In addition, the costs to prepare the site for development were estimated, and the holding costs associated with redevelopment were estimated.

In order to compare and evaluate the various redevelopment packages selected for detailed study, an analysis was made of the impact of each package on the operating budget of the City and a benefit/cost ratio for each package was developed based on discounted costs and benefits over the life of the project. This analysis was undertaken in current dollars and then discounted over the life of the project to reflect the opportunity cost associated with each plan or the present value of the costs and benefits of the plans under review. Since the City would in effect be investing in each of these developments it is of interest to express the stream of City revenue and expenses over the life of the project in terms of present value, discounting the future stream at a normal rate of return. Based on the results of this analysis a benefit/cost ratio was developed for the various plans. This analysis was used to show the relative benefits and costs of each plan on the City's operating budget. In every case the plans evaluated showed a ratio exceeding 1.00 indicating that over the life of the

TABLE V-1

	CHARLESTOWN			SOUTH BOSTON	
	Industrial/ Institutional A	Hotel/Industrial/ Housing/Institutional B	Hotel/Convention Center/Housing/ Institutional C	Industrial Park A	Containerport/ Industrial Park B
Total Direct Net Benefits <sup>1</sup>					
0%	23,030,000	45,090,000	196,057,000	32,905,000	27,102,000
6%	4,439,000	10,754,000	46,623,000	5,902,000	4,834,000
8%	2,761,000	7,403,000	32,420,000	3,475,000	2,820,000
Benefit/Cost Ratio: Without (With) Site Improvements					
0%	1.33 (1.25)	1.45 (1.38)	2.60 (2.49)	1.99 (1.72)	1.95 (1.72)
6%	1.23 (1.04)	1.39 (1.21)	2.47 (2.14)	1.56 (1.08)	1.52 (1.11)
8%	1.20 (.96)	1.37 (1.14)	2.42 (2.01)	1.42 (.92)	1.39 (.96)
Employment Generated					
Construction (Total)	1,283	2,068	4,425	420	320
Operation (Annual)	2,900	1,424	1,185	2,089	1,766
Regional Spending Generated (Annual)					
From Construction Payrolls	\$ 3,338,000	\$ 5,376,000	\$ 11,504,000	\$ 1,092,000	\$ 832,000
From Operation Payrolls	\$59,704,000	\$27,564,000	\$ 20,202,000	\$37,086,000	\$37,086,000

<sup>1</sup>For analysis of plans see p. V-19 (Charlestown package A), p. V-43 (Charlestown package B), p. V-66 (Charlestown package C), p. V-76 (South Boston package A), p. V-84 (South Boston package B)

projects each of them would have more benefits than costs. Highlights of the economic analysis are shown by data on Table V-1. This evaluation indicates that those redevelopment packages that show the highest net operating returns to the city largely in property taxes generate lower levels of regional spending and employment. The plan with the lowest return in regional spending and employment generation has the largest benefits to costs to the city in the form of taxes, while the plan with the smallest benefits to costs in taxes has the highest level of regional spending and employment generation.

In Charlestown, the plans range from predominant reuse of existing facilities in Package A to nearly total redevelopment in Package C. Total net direct operating benefits range from \$4.4 to \$46.6 million discounted at 6%.

The convention center alternative produces by far the greatest number of construction employment opportunities (4,425) while the industrial program generates the greatest number of permanent employees (2,900). All these alternatives yield sizable indirect benefits to Boston through spending in the regional economy. The greatest annual benefits, however, accrue from regional spending created by the industrial employment. The costs

the City or other redeveloper would incur to prepare the site for reuse vary from \$5.7 million for the industrial alternative to \$9.7 million for the hotel convention center and housing alternative. The holding costs for the developer of the property would range from \$1.3 million per annum for the industrial alternative to \$.6 million per annum for the hotel convention center and housing alternative. These holding costs include management, security, maintenance and insurance and assume appropriate demolition occurs where required in the respective plan. Initial financial analysis indicates that hotel development and possibly the specialty shopping center could be attractive for private development. However, the residential element and the industrial elements would require additional support by the City to be made an attractive investment.

In South Boston the plans range from predominant industrial reuse in Package A to a mixed use plan in Package B, which includes a containerport and industrial use. Total net direct operating benefits are \$5.9 million for Package A and \$4.8 million for Package B. In Package B the containerport component of the plan has not been evaluated. The number of construction related employment opportunities created by reuse of the annex for an industrial park is 420, or 100 more than created through mixed industrial redevelopment. The number of permanent jobs created at the industrial park would be approximately 2,100, or over 300 more than with the mixed industrial alternative. Indirect benefits from regional economy would be \$1.1 million for the industrial park alternative and \$0.8 million for the mixed industrial. Spending created as a result of permanent employment would be \$43.9 million from an industrial park and \$37.1 million from the mixed industrial development.

The costs the City or other redevelopers would incur to prepare the site for reuse is estimated to be \$6.9 million in Package A and \$5.0 million in Package B, the containerport-mixed industrial plan. The holding costs associated with each plan are approximately \$385,000 per annum and include management, security, maintenance and insurance. While the financial feasibility of elements of these plans were not tested, they are very much like the industrial elements tested for feasibility at the Charlestown site and it is likely that the industrial components of the plans would require some financial support for implementation.



## IMPLEMENTATION ISSUES

The analysis carried out in the following pages indicates that there are likely to be significant implementation problems with any of the plans under review. These issues relate to the potential site acquisition costs, the heavy front end costs to prepare the site and substantial holding costs for the developer. It is unlikely, with a few exceptions, that any one private developer or corporation could take on redevelopment of the sites without substantial inputs from the public sector.

These inputs would likely be in the form of site acquisition subsidies, provision of financial leverage through interest subsidy and site preparation. Previously the City was able to act as a middleman in the development process through the use of Federal urban renewal funds to subsidize the price of land as an inducement and a means of enhancing project feasibility. With these funds no longer available it will be necessary to devise new methods of providing the required subsidies. In this regard probably the most crucial factor will be the final site acquisition costs to the development entity, whether it is an agency of the City, State or other group. This is particularly critical due to the obsolescence of many of the buildings on the site and other factors which will make redevelopment a difficult process.

The City's Economic and Development Industrial Commission (EDIC) has certain powers that it can utilize to preserve and develop economic activity in the city. EDIC can use eminent domain, if necessary; it can utilize the financial leverage of the City to reduce interest rates and extend loan terms; it can write down land and it has a special relationship with the assessor's office. These powers, however, are relevant to only the industrial sections of the reuse plans and would not be available to other types of user, such as housing. Housing components of the various plans, on the other hand, might utilize Chapter 121-A corporation status for implementation of the housing elements of the plan.

While it appears that there are certain powers that various agencies of the City or State government might bring to bear on the issue of implementing

any of the plans outlined in this report, with the exception of some industrial reuse, there is no vehicle to generate the necessary subsidies to implement the plans outlined. All of the plans would require substantial land or site acquisition subsidies to make them economically viable.

With the lack of federal urban renewal funds local governments have generally utilized three major approaches to financing urban redevelopment:

1. Use of tax exempt bonds with subsequent repayment by the developer.
2. Use of tax-increment bonds.
3. Provision of incentives to developers.

Tax-Exempt Bonds with Reimbursement. Under this technique, the City floats a tax-exempt bond issue to pay for land acquisition, clearance, and public improvements in a redevelopment project. The private developer for the project agrees to pay the costs of interest and principal on the bonds, and often agrees to contribute additional sums to the City. The developer benefits because he pays lower interest rates than he would if he financed his land purchase and related costs under a mortgage. The City benefits because it is reimbursed for its project costs and also secures the public benefits resulting from construction of the project. Sometimes, in conjunction with this technique, the City will retain ownership of the land, leasing it to the developer for a fixed payment each year.

Tax-Increment Bonds. Redevelopment of an area to a higher and more intensive use creates an increase in real estate taxes paid to the city. Under tax-increment bonding, the City pledges the increased future taxes to pay off bonds that it floats to pay for public improvements in the project. After the bonds have been paid off, the City and other taxing jurisdictions receive the full amount of the increased taxes each year to use as they desire. Until that time, however, the City and other jurisdictions which rely on the property tax customarily receive tax revenues equivalent to those which were paid on properties at this site prior to redevelopment.

Developer Incentives. This method consists of encouraging projects for which there is a public purpose and desire through providing inducements, primarily financial, to the developer. This often takes the form of partial abatement of real property taxes on a development, particularly in the early years. Under this method, the City or redevelopment authority does not obtain funds for public improvements that it will carry out itself; however, in some cases, additional improvements can be made by the developer due to the offsetting tax incentives.

Each of these techniques has precedents and has been used or considered for projects in the state. The applicability of these approaches as well as others should be investigated for their potential in implementing a reuse for the Naval Shipyard sites.

#### Development Concept

One proposal for redevelopment of the Charlestown Naval Shipyard site involves a combination of institutional and industrial uses. The major elements of this proposal are identified and quantified on the accompanying Table V-2 of development parameters. As shown, the institutional sector contains school and museum uses as well as three major commercial activity types. A 200 unit hotel, approximately 30,000 square feet of retail space, and over 100,000 square feet of office space are also envisioned.

The majority of the site is devoted to industrial use. Existing industrial space at the Charlestown Shipyard will be rehabilitated, yielding approximately 1,180,000 square feet of space for industrial users. In addition, over 130,000 square feet of new industrial space would be constructed. Other supporting and adjacent land uses such as open space are described elsewhere in this report. These elements are included in the analysis here as expense items but are assumed not to be income sources.

#### Compatibility of the Land Uses

The likely success of any development depends not only on the market support for each use in isolation, but the combined impact of varying land uses within one development complex. The extent to which separate uses are compatible with each other and reinforce the viability of each use is an important determination in any project. This compatibility issue is especially crucial where a change in land use patterns is

TABLE V-2

INDUSTRIAL/INSTITUTIONAL DEVELOPMENT PARAMETERS  
CHARLESTOWN

<u>Land Use Category</u>	<u>Square Feet Or Units To Be Developed</u>	
	<u>Rehabilitated Space</u>	<u>New Construction</u>
Institutional		
School Department	686,630 Sq. Ft.	
Museum	165,647 Sq. Ft.	
Hotel <sup>1/</sup>	54,374 Sq. Ft.	
Retail	29,501 Sq. Ft.	
Office/Loft	108,127 Sq. Ft.	
Industry	1,179,016 Sq. Ft.	130,680 Sq. Ft.

<sup>1/</sup> Two hundred rooms.

Source: Wallace, Floyd, Ellenzweig, Inc.; et al.



contemplated or where market values are to be created over time through redevelopment operations.

The physical design of an industrial and institutional mixture of uses is a key factor in the determination of compatibility. Without proper design and phasing of development, uses such as museum, hotel and industry might not be in harmony. The placement and type of industry at Charlestown will determine the viability of the different uses in one development. Within the institutional component itself, the uses of hotel, retail and office draw on and reinforce each other's market area and are, therefore, well suited to be located adjacent to each other.

A second concern is the compatibility of the land uses with respect to their larger surroundings in the community of Charlestown. The institutional uses do not conflict with the residential character of the community, and, in fact, might well be a very positive asset to the aesthetic enhancement of the area. Industrial uses of the Charlestown Shipyard could pose physical and environmental concerns discussed elsewhere in this report. Without knowledge of the specific type of industrial user to occupy space at the site, the impact of industry on other uses cannot be determined. This issue should be given detailed consideration in selecting industries for the Charlestown site, however.

#### Marketability and Phasing

The likely market support for the various use components of the industrial/institutional alternative depends on market conditions at the time of development. The demand for reuse of the existing buildings will be from basically two sources, shipbuilding and related activities and those industries that can most effectively reutilize the existing buildings and equipment, including harbor-related industries.

The potential for shipyard related reuse will depend on a number of factors including the demand for ships, the ability of the site to adequately compete against other sites in the United States and abroad, and the size and quality of facility operated.

A recent study for Massport by Robert Gladstone Associates which reviewed the market for

shipbuilding in South Boston indicated that while there was only a weak to mild market support for this use, it should be given serious consideration as a reuse due to the potential benefits to be derived in terms of jobs and relatively short start up time. There appears to be a sufficient market potential over the next decade, particularly for ships concentrated in the energy-oriented class, as well as the potential for fabrication and assembly of off-shore petroleum rigs, to merit serious consideration for reuse as a shipbuilding facility.

The market potential for the reuse of the existing industrial buildings will be highly dependent on the development of a target industries list, on a marketing of these facilities to target industries and on a careful follow through of marketing efforts. The following analysis is an effort to get an overview of the types of industry most likely to be interested in the sites and develop an initial idea of the range of industries that could reuse the site and the existing equipment.

Previous experience with inner city industrial space indicates that much of this space is utilized by small, but growing manufacturing industries, by the warehouse and wholesale trade industry, and by certain labor intensive manufacturing industries such as the food processing, apparel and printing industries. Surveys of potential industrial users for the Brooklyn Navy Yard project carried out by Fordham University a number of years ago again pointed up the problems for reuse of such space. In a national survey of large and medium sized manufacturers to ascertain interest in reusing the Brooklyn Yard, it was found that almost without exception, the only industries that were interested in reuse of the facility were those industries already located in the City and more specifically in Brooklyn, who were in need of expansion space. Most of these industries were less labor intensive than the shipyard use they replaced.

With this in mind and drawing on studies of the First National Bank, EDIC and others, an attempt was made to isolate those industries that were a) compatible with shipbuilding (i.e., could effectively reuse space occupied by shipbuilding; b) were expanding and competitive in New England and Boston; and c) were presently lo-

cated in the City and/or the State.

The results of this cross tabulation are shown by data in Table V-3 and represent target industries that would most likely be interested in reuse of parts of the existing facilities. These industries have been broken down on the table into four categories, as follows:

- Category 1: Those industries that are expanding in the region, are compatible with shipyard reuse and were singled out by EDIC as target industries for the City of Boston.
- Category 2: Those industries that are expanding in the region, that are compatible with shipyard reuse and have substantial representation in the State with a large number of operations employing more than 50 people.
- Category 3: Those industries that are expanding in the region, that are compatible with shipyard reuse, but that have fewer firms represented statewide.
- Category 4: Those industries, that while not growing in the region, are considered to be compatible with shipyard reuse and are on the EDIC list of target industries for the City of Boston.

While it is beyond the scope of this report, it should be possible to develop a systematic approach to the various industry groups identified and inquire as to their interest in potential reuse of the Navy yard properties particularly with a clear identification of individual building reuse possibilities and a development prospectus.

While a more complete picture of the potential demand for hotel space in Boston is given in another section of this report, on pages        to       , an estimate of hotel demand based on potential local demand in Charlestown was accomplished. Based on the implementation of the National Park proposal and achievement of visitation levels estimated by the Park Service, it is estimated that a 200

	SIC	Industry Description	# Firms in the State	# Firms in Boston	% in Boston	# Firms With Over 50 Employees	% of Firms Having Over 50 Employees	# Sq. Per Employee	Annual Wage Level
Category 1	2541	Wood Partitions	34	13	38.2	4	11.8	639	10,387
	3531	Food Products Machinery	19	3	15.8	4	31.1	512	10,046
	3544	Blowers and Exhaust and Ventilation Fans	14	4	28.6	3	21.4	-	8,933
		Subtotal	67	20	29.9	11	16.4	-	-
Category 2	3431	Screw Machine Products	72	3	6.9	11	15.3	349	8,330
	3452	Bolts, Nuts, Screws, Rivets and Washers	23	1	4.3	11	47.8	260	8,330
	3544	Special Dies and Tools, Die Sets, Jigs and Fixtures, and Industrial Molds	267	11	4.1	20	7.5	271	10,046
	3543	Machine Tool Accessories and Measuring Devices	43	1	1.3	13	30.0	840	10,046
	3552	Textile Machinery	72	1	1.4	18	25.3	-	9,843
	3554	Paper Industries Machinery	27	1	3.7	15	55.6	317	9,843
	3633	Speed Changers, Industrial High Speed Drives and Gears	24	2	8.3	12	50.0	797	8,933
		Subtotal	550	22	4.0	96	17.8	-	-
Category 3	2542	Metal Partitions	8	0	-	2	50.0	-	10,387
	3479	Coating, Engraving and Allied Services, Not Elsewhere Clas- sified	77	6	5.2	8	10.4	805	7,833
	3536	Holsts, Industrial Cranes, and Monorail Systems	2	-	-	-	-	-	10,985
	3541	Machine Tools, Metal Cutting Types	62	4	6.3	9	14.3	192	10,046
	3542	Machine Tools, Metal Forming Types	20	2	10.0	1	5.0	337	10,046
	3553	Woodworking Machinery	8	1	12.5	-	-	300	9,843
	3533	Printing Trades Machinery and Equipment	15	3	20.0	1	6.7	450	9,843
	3561	Pumps and Pumping Equipment	13	-	-	6	46.3	413	8,933
	3567	Industrial Process Furnaces and Ovens	7	1	14.3	2	28.6	434	8,933
		Subtotal	208	15	6.7	31	42.3	-	-
Category 4	3444	Sheet Metal	120	15	12.5	12	10.0	476	9,622
	3581	Automatic Merchandising Machines	2	-	-	1	50.0	410	9,859
		Subtotal	122	15	12.3	13	10.7	-	-
		TOTAL	947*	72	7.6	153	16.1	-	-

\* Some industries double counted.

Source: Economic Research Associates

plus room hotel could be supported. The 1985 estimate of the number of visitors, based on the National Park Service projections, is over 1.5 million persons. Data in Table V-4 presents the determination of the room-night demand and the supportable rooms at the Charlestown site. The medium penetration figure results in a 1985 market potential for 233 rooms. While the exact size of an appropriate hotel/motel facility cannot be determined to the room through this analysis, the general magnitude of rooms supportable is indicated.



TABLE V-4

PROJECTED DEMAND FOR HOTEL/MOTEL ROOMS FOR  
VISITORS TO CHARLESTOWN SITE  
1985

<u>Category</u>	<u>Number</u>
Number of Visitors to Charlestown Site	1,547,200
Number Utilizing Commercial Lodging in Boston	479,632
Length of Stay	2 nights
Persons Per Room	3.2
Total Room-Nights Needed in Area	299,770
Supportable Rooms Needed in Area	
100 Percent Occupancy	821
70 Percent Occupancy	1,173

1/ Assumes 50 percent of visitors are local residents and are not staying overnight; and 62 percent of remaining visitors stay overnight in commercial lodging, in line with Boston 200 study findings, and ERA findings from analysis of Bicentennial impact.

Source: Economics Research Associates.

The institutional uses contemplated, however, are predominantly small in scale, at least for the income generating uses of hotel, retail, and office. The support for public uses such as a museum depends on the identification of specific users and attracting them to the site, and for this reason is not subject to direct market analysis. The hotel, retail, and office components could be absorbed within two years time from their availability for initial occupancy.

Project Phasing. Project phasing was estimated based on factors such as market absorption, construction and rehabilitation timing and estimates of general financial considerations.

The attainment of complete occupancy of the industrial space will require a vigorous marketing effort since the market for industrial space in Boston has not been strong in recent years. A more detailed analysis of industrial potential is given in the discussion of reuse at the South Boston Naval Annex. Multiple tenants will most

TABLE V-5

WARRANTED HOTEL/ MOTEL FACILITIES  
AT CHARLESTOWN . SITE  
1985

	Occupancy	
	100 Percent	70 Percent
Supportable Rooms Needed in Area	821	1,173
Tourist Market as a Percentage of Total Market <u>1/</u>	75.4	75.4
Total Supportable Rooms Needed in Area	1,089	1,556
Percentage of Site Penetration of Total Area Demand		
Low	10%	10%
Medium	15%	15%
High	20%	20%
Warranted Hotel/Motel Facilities at Charlestown Navy Yards Site		
Low	109	156
Medium	163	233
High	218	311

1/ Assumes there is a demand for rooms from businessmen coming to Boston equal to the percentage of all visitation which businessmen represented in 1970.

Source: Economics Research Associates.

likely have to be found, and the entire development package must be attractive enough to lure potential users from going to other sites. Economics Research Associates has assumed a seven year leasing period from the time space is available for occupancy until all available space at Charlestown is occupied. This absorption pace, including some marketing prior to the actual availability of space, represents an average annual absorption of between 150,000 to 200,000 square feet per year.

Attractiveness of Project for Private Development  
Related to the marketability of the project is the expected financial performance of the various development components. To estimate financial performance of Package A two of the industrial reuse elements were tested from the standpoint of the private sector. These two elements were the rehabilitated industrial area and the new industrial buildings. The expected, or "pro forma", annual financial return of these two components are computed on the accompanying tables. Data in Table V-6 shows the expected return on the space that has been rehabilitated. This space utilizes

PRO FORMA ANNUAL FINANCIAL STATEMENT  
INDUSTRIAL DEVELOPMENT (REHABILITATION ONLY)  
CHARLESTOWN

TABLE V-6

Item	Measurement Basis	Value at Various Site Acquisition Costs Per Square Foot			
		0	\$2	\$4	\$6
<u>Development Costs</u>					
Structures (Rehabilitation) <sup>1/2</sup>	\$ .47/sq.ft. (1,179,000 sq')	\$ 560,000	\$ 560,000	\$ 560,000	\$ 560,000
Site Acquisition Cost	(1,179,000 sq')	0	2,358,000	4,716,000	7,074,000
Parking	90% of 650 spaces @ \$700/space	409,500	409,500	409,500	409,500
Total Capital Costs		969,500	3,327,500	5,685,500	8,043,500
<u>Income</u>					
	\$2.00/sq.ft. (1,179,000 sq')	2,358,000	2,358,000	2,358,000	2,358,000
Income @ 20% vacancy		1,886,400	1,886,400	1,886,400	1,886,400
<u>Expenses</u>					
Maintenance	\$ .40/sq.' (1,179,000 sq')	471,600	471,600	471,600	471,600
Management	\$ .10/sq.' (1,179,000 sq')	117,900	117,900	117,900	117,900
Taxes and Insurance	\$ .75/sq.' (1,179,000 sq')	884,250	884,250	884,250	884,250
Total Expenses		1,473,750	1,473,750	1,473,750	1,473,750
<u>Net Income Before Debt Service</u>					
0 vacancy		884,250	884,250	884,250	884,250
20% vacancy		412,650	412,650	412,650	412,650
<u>Debt Service</u>					
	75% loan for 25 years at:				
	6% (.0797)	57,952	198,901	339,851	480,800
	7.5% (.0897)	65,223	223,858	382,492	541,126
	9% (.1018)	74,021	254,055	434,088	614,121
<u>Annual Cash Flow</u>					
0 vacancy	6% loan	826,298	685,349	544,399	401,450
	7.5% loan	819,027	660,392	501,758	343,124
	9% loan	810,229	630,195	450,162	270,129
20% vacancy	6% loan	354,698	213,749	72,799	68,150
	7.5% loan	347,427	188,792	30,158	128,476
	9% loan	338,629	158,595	21,438	201,471
<u>Equity</u>					
Cash requirement	25% of capital costs	242,375	831,875	1,421,375	2,010,875
% of return on equity before income taxes					
0 vacancy	6% loan	340%	82%	38%	20%
	7.5% loan	338	79	35	17
	9% loan	334	76	32	13
20% vacancy	6% loan	146%	26%	5%	--
	7.5% loan	143	23	2	--
	9% loan	140	19	--	--

<sup>1/2</sup>Wallace, Floyd and Ellensweig

Sources: As noted; and Economics Research Associates

the existing power plant and therefore has minimum rehabilitation costs and can support higher site acquisition costs, as indicated by data in the table. The new space, on the other hand, can support very modest site acquisition costs and becomes unfeasible given the conditions indicated in the "pro forma" analysis, under conventional financing and development. (Table V-7)

An alternative way of evaluating the feasibility of the new industrial space is to determine the required rent level if the project were financed through General Obligation bonds by the City through EDIC. At a 6.4% interest rate to the City for General Obligation bonds for 20 years, the required rent, before taxes, would be \$1.87/sq. ft. at \$0 site acquisition costs, \$1.99/sq. ft. at 10% site acquisition costs, and \$2.11/sq. ft. at 20% site acquisition costs. It appears, then, that even this means of financing the project would be viable only with a minimum site acquisition cost.

PRO FORMA ANNUAL FINANCIAL STATEMENT  
INDUSTRIAL DEVELOPMENT (NEW CONSTRUCTION ONLY)  
CHARLESTOWN NAVY YARDS

TABLE V-7

Item	Measurement Basis	Value at Various Site Acquisition Costs as a Percent of Structure		
		0%	10%	20%
<u>Development Costs</u> <sup>1</sup>				
Structures (new construction)	\$14.00/sq.ft. (130,000 sq.')	\$1,820,000	\$1,820,000	\$1,820,000
Site Acquisition Cost	Percent of structures	0	182,000	364,000
Parking	10% of 650 spaces @ \$700/space	45,500	45,500	45,500
Total Capital Costs		1,865,500	2,047,500	2,229,500
<u>Income</u>				
	\$2.50/sq.ft. (130,000 sq.')	325,000	325,000	325,000
Income with 10% vacancy		292,500	292,500	292,500
Income with 20% vacancy		260,000	260,000	260,000
<u>Expenses</u>				
Maintenance	\$..40/sq.' (130,000)	52,000	52,000	52,000
Management	\$ .10/sq.' (130,000)	13,000	13,000	13,000
Taxes and Insurance	\$1.00/sq.' (130,000)	130,000	130,000	130,000
Total Expenses		195,000	195,000	195,000
<u>Net Income Before Debt Service</u>				
0 vacancy		130,000	130,000	130,000
10% vacancy		97,000	97,000	97,000
20% vacancy		65,000	65,000	65,000
<u>Debt Service</u>				
	75% loan for 25 years at:			
	6% (.0797 constant)	111,510	122,389	133,268
	7.5% (.10897 constant)	125,502	137,746	149,990
	9% (.1018 constant)	142,431	156,327	170,222
<u>Annual Cash Flow</u>				
0 vacancy	6% loan	18,490	7,611	-3,268
	7.5% loan	4,498	-7,746	-19,990
	9% loan	-12,431	-26,327	-40,222
<u>Equity</u>				
Cash requirement	25% of capital costs	466,375	511,875	557,375
<u>% return on equity before income taxes</u>				
	6% loan	4%	1%	--
	7.5% loan	1%	--	--
	9% loan	--	--	--

<sup>1</sup>Wallace, Floyd and Ellensweig  
Sources: As noted; and Economics Research Associates

TABLE V-8

TOTAL DIRECT REVENUES FROM INDUSTRIAL/INSTITUTIONAL PACKAGE  
CHARLESTOWN

Revenue Source	Use				Total
	Hotel	Retail	Office	Industrial	
Property Taxes	\$260,000	\$23,000	\$ 66,500	\$1,368,100	\$1,717,600
Personal Income Taxes	900	3,400	23,800	136,100	164,200
Consumer & Transaction Taxes	1,800	11,500	-	-	13,300
Business Excise Taxes	800	1,700	10,100	64,500	77,100
Miscellaneous Taxes	62,400	-	-	-	62,400
Total	\$325,900	\$39,600	\$100,400	\$1,568,700	\$2,034,600

Source: Economics Research Associates.



#### Annual Direct Revenues at Project Completion

The annual direct revenues from each element of the institutional/industrial alternative have been calculated for a stabilized year, when the project is completed. The data on revenue sources and computation techniques presented in Appendix B is the basis for these revenue estimates. These revenues are presented on the accompanying table, broken down by revenue source and land use categories. As shown on Table V-8, total direct revenues from the industrial/institutional development package exceed \$2,000,000 annually. Over 75 percent of these revenues are generated by the industrial sector. The next largest revenue source to the City is from hotel operations. The hotel element provides \$326,000 annually in tax revenue benefits to the City, or 16 percent of the total revenues obtained from the entire industrial/institutional development package.

With this alternative as with the others, the importance of the property tax in generating revenue for the City is evident. Over \$1,700,000 in annual revenues come from the property tax. The derivation of this data is found in the Appendix to this report.

#### Annual Expenses at Project Completion

The annual direct expenses for the industrial/institutional development are presented on the accompanying Table V-9. This data is derived using public service cost data for Boston jurisdictions. (See Appendix B). The total annual expenses for direct public service costs are approximately \$956,000. As expected, the two largest expense categories are for industrial and institutional development, the two uses with the largest portions of the building and land area.

In this development alternative and elsewhere, the importance of the non-revenue generating institutional sector is evident. In this case, the museum and school require \$358,000 in direct public service expenses, yet produce no revenues to offset these City expenses. These non-income producing elements of all alternatives, and especially the industrial/institutional and housing/industrial/institutional alternatives, adversely affect the financial returns from the project to the City.

Direct Benefits and Costs Over the Life of the Project

To assess the total impact of a development project, the revenues and expenses over the entire useful life of the development must be determined. In this way, the total project impact, from construction to final occupancy, can be measured. In this analysis, the project is

TABLE V-9

DIRECT EXPENSES FROM INDUSTRIAL/INSTITUTIONAL PACKAGE  
CHARLESTOWN

<u>Use</u>	<u>Expense Basis<sup>1/</sup></u>	<u>Annual Expense</u>
Hotel	\$710 per 1,000 Sq. Ft.	\$ 38,600
Retail	\$710 per 1,000 Sq. Ft.	20,900
Office	\$300 per 1,000 Sq. Ft.	32,400
Industrial	\$320 per 1,000 Sq. Ft.	419,100
Institutional	\$420 per 1,000 Sq. Ft.	<u>358,000</u>
Subtotal		\$869,000
Common Area Charges and Con- tingency (10%)		<u>\$ 86,900</u>
Total		\$955,900

1/ Based on Boston Municipal Research Bureau and Abt Associates,  
The Effect of High Density Development on Municipal Finances in the  
City of Boston, April, 1974.

Source: As noted; and Economics Research Associates.

assumed to have a useful life of 40 years, with development occurring in the 10 years preceding the beginning of the project life. Development is assumed to begin in 1977, with project completion in 1986 and the useful life running until 2,026.

The accompanying Table V-10 identifies the direct revenues from industrial/institutional development of the Charlestown Navy Yards site. The revenues are prorated during the construction years according to the percentage of the project completed. The phasing corresponds to that discussed earlier under the marketability and phasing section. Total direct revenues in a stabilized year are \$2,035,000, with revenues beginning in 1979 at \$473,000. The total revenues over the project life exceed \$93,000,000.

To take into consideration the timing of the receipt of revenues and the occurrence of expenses, the revenues and expenses must be reduced to a common denominator. This reduction, or discounting, expresses dollar amount in current (1974) dollars, or present value terms. The exact size of the discount rate that is appropriate depends on many factors and is the topic of continuing academic debate. For this analysis, three discount rates are given, varying from 6 to 10 percent. For public projects involving long term benefits and requiring substantial initial costs, the 6 percent rate is perhaps most appropriate. At a discount rate of 6 percent, the total benefits over the life of the project are \$23,370,000.

The following Table V-11 presents the analysis of public expenditures needed for the industrial/institutional development. As examined earlier, these costs include direct public service expenses, general administrative costs, and costs to maintain the existing facilities during the construction period. In addition, there are special site improvement costs for utilities, pier demolition and repair, and resolution of external access problems. The total annual costs are estimated at \$1,471,000 for each stabilized year. Site improvement costs amount to \$4,215,000, while the existing facilities will cost over \$2,000,000 to maintain during the construction period. Total costs over the life of the project, then, are \$74,247,000. These costs, when discounted at 6 percent, amount to \$22,557,000. Of note here are the substantial costs for non-revenue generating

**DIRECT REVENUES FROM INDUSTRIAL/INSTITUTIONAL  
ALTERNATIVE CHARLESTOWN  
1977-2026  
(Dollars in Thousands)**

TABLE V-10

<u>Use</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	Total: <u>1987-2026</u>	Total: <u>1977-2026</u>
Hotel	0	0	163	326	326	326	326	326	326	326	326	13,040	15,485
Retail	0	0	20	40	40	40	40	40	40	40	40	1,600	1,900
Office	0	0	50	100	100	100	100	100	100	100	100	4,000	4,750
Industrial	0	0	240	479	717	957	1,199	1,437	1,569	1,569	1,569	62,760	70,927
Institutional/Other	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>0</b>	<b>473</b>	<b>945</b>	<b>1,183</b>	<b>1,423</b>	<b>1,665</b>	<b>1,903</b>	<b>2,035</b>	<b>2,035</b>	<b>2,035</b>	<b>81,400</b>	<b>93,062</b>
<b>Present Value of Total Discounted at</b>													
6 Percent	0	0	375	706	834	946	1,045	1,126	1,136	1,072	1,011	16,130	23,370
8 Percent	0	0	348	643	745	830	900	952	943	873	808	10,407	16,641
10 Percent	0	0	323	587	668	730	777	807	785	713	648	6,975	12,365

Source: Economics Research Associates.

**PUBLIC EXPENDITURES FROM INDUSTRIAL/INSTITUTIONAL ALTERNATIVE  
CHARLESTOWN NAVY YARDS SITE  
1977-2026  
(Dollars in Thousands)**

TABLE V-11

<u>Expense Item</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	Total: <u>1987-2026</u>	Total: <u>1977-2026</u>
<b>Direct Public Service Expenses for</b>													
Hotel	0	0	20	39	39	39	39	39	39	39	39	1,560	1,853
Retail	0	0	10	21	21	21	21	21	21	21	21	840	997
Office	0	0	17	32	32	32	32	32	32	32	32	1,280	1,521
Industrial	0	0	64	128	191	256	320	384	419	419	419	16,760	18,941
Institutional	0	0	119	238	358	358	358	358	358	358	358	14,320	16,825
Other	0	0	23	46	64	71	77	83	87	87	87	3,480	4,018
<b>Total</b>	<b>0</b>	<b>0</b>	<b>253</b>	<b>504</b>	<b>705</b>	<b>777</b>	<b>847</b>	<b>917</b>	<b>956</b>	<b>956</b>	<b>956</b>	<b>38,240</b>	<b>44,155</b>
<b>General Administrative Costs <sup>1/</sup></b>	<b>0</b>	<b>0</b>	<b>136</b>	<b>271</b>	<b>380</b>	<b>418</b>	<b>456</b>	<b>494</b>	<b>515</b>	<b>515</b>	<b>515</b>	<b>20,600</b>	<b>23,785</b>
<b>Site Utilities, Pier Demolition and repair, costs external to the site <sup>2/</sup></b>													
	1,405	1,405	1,405	-	-	-	-	-	-	-	-	-	4,215
<b>Maintenance of Existing Facilities <sup>3/</sup></b>													
	490	490	376	263	205	147	89	32	0	0	0	0	2,092
<b>Total Costs</b>	<b>1,895</b>	<b>1,895</b>	<b>2,170</b>	<b>1,038</b>	<b>1,290</b>	<b>1,342</b>	<b>1,392</b>	<b>1,443</b>	<b>1,471</b>	<b>1,471</b>	<b>1,471</b>	<b>58,840</b>	<b>74,247</b>
<b>Present Value of Costs Discounted at</b>													
6 Percent	1,687	1,591	1,719	776	909	893	873	854	821	775	731	11,659	22,557
8 Percent	1,625	1,504	1,595	706	813	783	752	722	681	631	584	7,524	17,336
10 Percent	1,566	1,423	1,482	645	728	689	649	612	567	516	469	5,042	13,919

<sup>1/</sup> General Administrative costs represent residual expense item, with direct public service costs equalling 65 percent of total costs.

<sup>2/</sup> From estimates by Wallace, Floyd, Ellenzweig, Inc.; Booz, Allen, Hamilton; and Barton Aschman Associates.

<sup>3/</sup> Expenses incurred to maintain existing facilities during construction; based on percentage of project completed during each year.

Source: As noted, and Economics Research Associates.



uses and the large "front end" costs for site improvements. These costs greatly reduce the sizable benefits produced by the industrial sector.

An alternative approach is to delete the site improvement costs from the analysis because these costs are capital and not operating costs. These costs would be born by the development group or as City capital costs depending on the nature of the development process. When this adjustment is made, the public expenditures over the life of the project are as follows:

TOTAL EXPENSE ITEM	\$70,032,000
Present Value of Costs	
Discounted at 6%	\$18,931,000
8%	\$13,880,000
10%	\$10,626,000

These two approaches give benefit/cost ratios of 1.22 without site improvements and 1.04 with site improvements, discounted at 6%. The Benefit/Cost ratio is derived by dividing total project revenue by total project expenditures.

#### Employment and Payrolls

In addition to the direct tax revenue benefits accruing to the City of Boston from the development of the Navy yards, the project will contribute additional indirect benefits to the regional economy. There will be benefits generated by the construction-related employment and payrolls during development phasing, and also benefits from the operational or permanent employment opportunities created. These benefits, in turn, influence and expand the entire regional economy. Further, the expenditure made on the site increase regional income and employment through the multiplier effect. Not all benefits can be quantified. Nonetheless, this section identifies and outlines the types and magnitudes of benefits derived from the reuse of the Charlestown Navy Yards for industrial/institutional development.

The development of the Navy Yards will create employment opportunities both during construction and throughout the operational life of the facilities. The magnitude of the employment, and resultant payrolls, will vary with the specific components of the development alternatives. The following sub-sections outline the relative merits of the industrial/institutional development alternative in terms of construction and operational employment created.

Development Costs. Prior to an examination of employment generation, the development costs for industrial and institutional development must be estimated. Subsequent estimates of the impact of the project depend on the extent of these expenditures. As shown on the accompanying Table V- 12, development costs for the industrial and institutional program are estimated at \$32,863,000. These cost estimates include demolition, rehabilitation, and new construction within the site itself. Other costs not listed here would also be incurred to improve the site in general, increase transportation access, and provide utilities. These additional costs are included in the analysis that follows.

Construction-Related Employment. The on site

TABLE V-12

DEVELOPMENT COST ESTIMATES FOR  
INDUSTRIAL/INSTITUTIONAL ALTERNATIVE  
CHARLESTOWN

<u>Site Improvement</u>	<u>Total Demolition and Construction Costs</u>
<u>Access</u>	\$ 431,000
<u>Institutional</u>	
School Department	\$17,000,000
Museum	3,479,000
Hotel	4,000,000
Retail	354,000
Parking	2,904,000
Open Space	377,000
Office/Loft	1,300,000
Subtotal	\$29,414,000
<u>Industrial</u>	
Industry	\$ 3,018,000
<u>Total</u>	\$32,863,000

Source: Wallace, Floyd, Ellenzweig, Inc.

TABLE V-13

CONSTRUCTION RELATED PAYROLL AND EMPLOYMENT GENERATED  
INDUSTRIAL/INSTITUTIONAL PACKAGE  
CHARLESTOWN

	1977 - 1986	
	<u>Total</u>	<u>Average Annual</u>
Total Costs for Demolition, Rehabilitation, and New Construction (in thousands) <sup>1/</sup>	\$37,078	\$3,708
Construction Related Payroll (in thousands) <sup>2/</sup>	\$16,685	\$1,669
Jobs at \$13,000 per Man-Year <sup>3/</sup>	1,283	128

<sup>1/</sup> Includes utility and pier improvement costs of \$4,215,000, broken down as follows: site utilities (\$2,230,000); pier demolition (\$180,000); pier repair (\$1,085,000); and transportation costs external to the site (\$720,000).

<sup>2/</sup> Equal to 45% of construction expenditures.

<sup>3/</sup> Average wage in the construction industry in 1972 was \$11,181, according to the Massachusetts Division of Employment Security; 1974 rate reflects inflation and real wage rate growth.

Source: Economics Research Associates.

TABLE V-14

OPERATIONAL PAYROLL AND EMPLOYMENT GENERATED  
INDUSTRIAL/INSTITUTIONAL PACKAGE  
CHARLESTOWN

<u>Use</u>	<u>Total Yearly Payroll</u> <sup>1/</sup>	<u>Number of Jobs Generated</u> <sup>1/</sup>
Hotel	\$ 164,000	23
Retail	\$ 609,000	87
Office	\$ 4,330,000	433
Industry	<u>\$24,749,000</u>	<u>2,357</u>
Total	\$29,852,000	2,900

Source: Economics Research Associates.

construction-related employment is estimated based on the total construction expenditures of the project. Based on experience, construction-related payrolls have equalled approximately 45 percent of direct construction costs. This total payroll figure can be converted to an estimation of the number of construction jobs generated by assuming an average wage per construction worker. The Massachusetts Division of Employment Security has determined the average wage in the construction industry in Massachusetts. After adjusting this figure to reflect both inflation and growth in real income, the resultant average wage, used in this analysis, is \$13,000 per year.

The construction period is taken at 10 years. The number of jobs per man-year can then be computed on a total and average annual basis. This analysis is performed on the following Table V-13 yielding a total of 1,283 jobs created during the entire construction period of the industrial/institutional project. This total converts to 128 jobs per year.

Operational-Related Employment. Employment and payrolls generated as a result of the operation of the industrial and institutional facilities cannot be determined precisely until the specific tenants and the exact sizing parameters and operating procedures are established. Nonetheless, certain planning standards and utilization data from similar land use facilities are available for estimating operational employment. These standards generally relate employment to space usage.\* Applying these standards to the separate components of the industrial/institutional development under consideration yields the operational data found on the following Table V-14. As shown, the project creates 2,900 permanent employment opportunities. The total yearly payroll from these jobs is nearly \$30 million.

The Employment Multiplier. The multiplier is an economic phenomenon created when outside or new dollars are injected into the economy. The

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\* See, for example, Ide Associates, Inc., Estimating Land and Floor Area Implicit in Employment Projections. How Land and Floor Area Usage Rates Vary by Industry and Site Factors. Volume I, July, 1970.



multiplier identifies how many times each new dollar is spent and respent within the local economy. The magnitude of the multiplier is contingent upon the economic self-sufficiency of the area. The impact of construction and operational employment on the regional economy can be analyzed in terms of the employment multiplier.

The employment multiplier quantifies the relationship between a one-unit change in supportive employment in the other sectors of the economy. An analysis of the size of the employment multiplier was done by Eliahu Romanoff of the Regional Science Research Center for the Lowell metropolitan area. The employment multiplier was found to be 2.52. In Romanoff's words, "...for each employee directly engaged in the preparation and execution of construction-related investments, a total of 2.52 employees will be required in the City, where 1.52 employees represent the added indirect labor requirements associated with the program."\* Other employment multiplier estimates for mass transit construction and highway construction have resulted in multipliers of basically similar magnitude. Since the multipliers tend to increase in a more urbanized and interdependent economy, the estimate used here of an employment multiplier of 2.5 is regarded as realistic.

Using this figure, the effect of the employment multiplier on the industrial and institutional program is shown on the accompanying Table V-15. The annual impact from construction payrolls is \$3,338,000, while the impact from operational payrolls is \$59,704,000.

Site Preparation Costs of the Project. The purchaser will incur costs to prepare the Charlestown site for development. These costs include capital costs such as utilities, pier improvements, demolition costs, improving access to the site, and operating costs such as maintaining the existing buildings until redevelopment can take place. These costs are broken down as follows:

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\* Eliahu Romanoff, Regional Science Research Center. Regional Impact of Investment in Housing Renewal, Project Multipliers, and Unemployment. December, 1971.

Site Utilities	\$2,230,000
Pier Demolition	\$ 180,000
Pier Repair	\$1,085,000
Access External to Site	\$ 720,000
Internal Access	\$ 431,000
Building Demolition	\$ 820,000

Total	\$5,466,000
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These costs of preparing the site for industrial and institutional development should be weighed when considering the attractiveness of acquisition of the site for reuse.

The above costs do not include costs associated with holding the property until reuse occurs. These costs would be substantial and would include management, maintenance, security and insurance costs. It is likely that these costs would be about \$.45 a sq. ft. of floor area per year for comparable space, or \$1,262,115 per year, for this alternative.

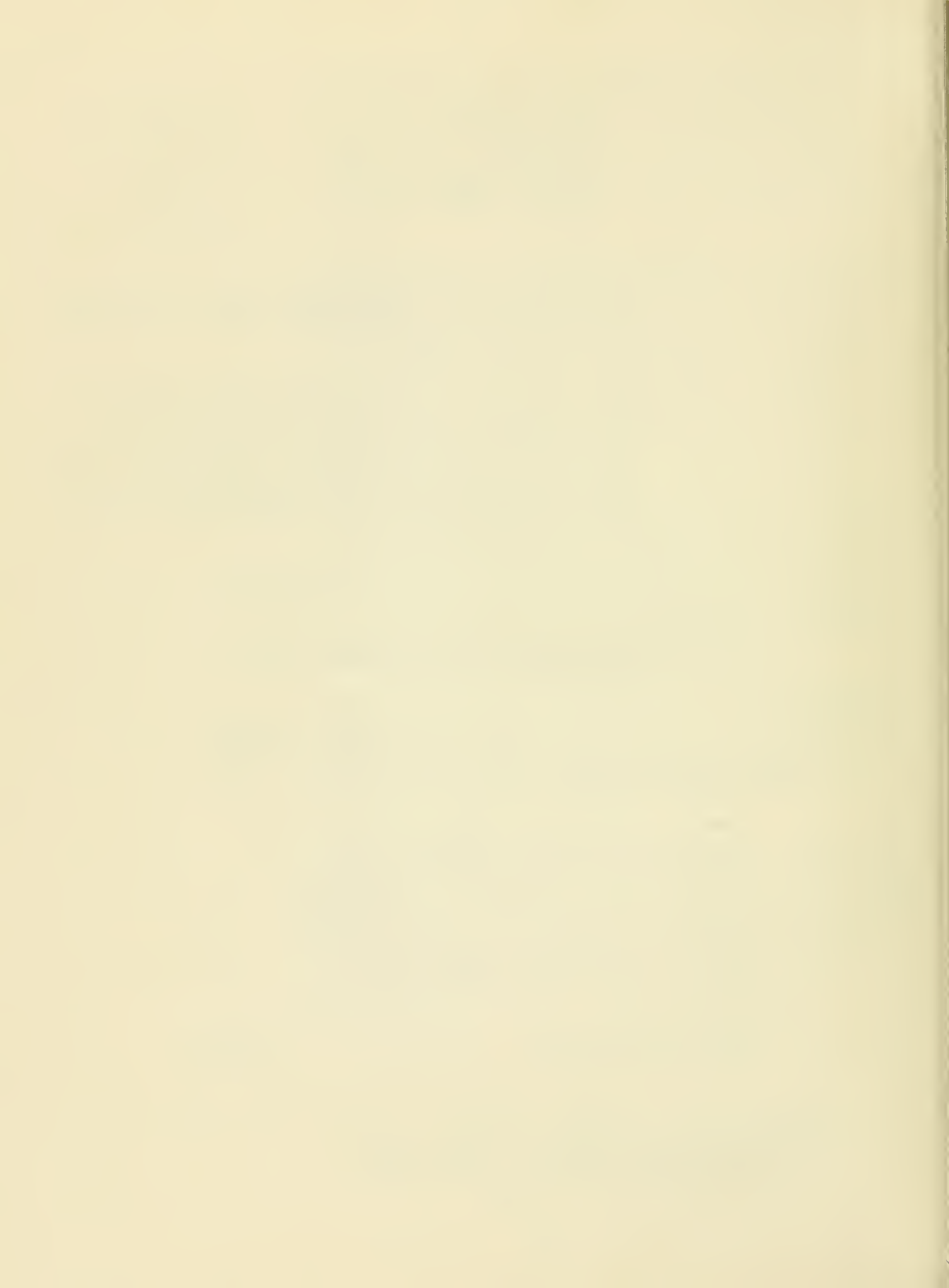
TABLE V-15

ECONOMIC IMPACT OF THE EMPLOYMENT MULTIPLIER  
INDUSTRIAL/INSTITUTIONAL PACKAGE  
CHARLESTOWN

	<u>Employment</u>	<u>Payrolls</u>	<u>Regional Spending</u>
<u>Construction Related Impact</u>			
Employment			
Total	1,283		
Annual	128		
Payroll			
Total		\$16,685,000	
Annual		\$ 1,669,000	
<u>Operational Impact (Annual)</u>			
Employment	2,900		
Payroll		\$29,852,000	
<u>Multiplier Effect (at 2.5)</u>			
From Construction Payroll $\frac{1}{2}$			\$ 3,338,000
From Operational Payrolls $\frac{1}{2}$			\$59,704,000

1/ Assuming take-home pay represents 80% of payrolls.

Source: Economics Research Associates.



#### Development Concept

The development of the Charlestown Naval Shipyard site for housing and industry was examined as one alternative land use package. The specific components and relative magnitudes of development for the various land uses is presented in the following Table V-16. Industrial and warehousing uses each comprise over one-half million square feet of building space, with the majority of the space being the reuse of existing buildings. A total of 500 housing units are planned, with an average unit price of \$30,000. Units will average 1,000 square feet in size.

A third major component is a 400 room hotel, built at the cost of \$25,000 per room. Retail facilities will consist of 80,000 square feet of space, including 19,000 square feet in existing buildings. A 200 ship marina is estimated to cost \$250,000 to construct. A small amount of office space is also programmed for a portion of the institutional area. Other supporting land uses and institutional uses are detailed on the program table.

#### Compatibility of the Land Uses

The compatibility of the differing land uses within the Charlestown site depends largely on the specific types of users of the space and the physical relationship of the uses. The proposed design clusters hotel and retail activities and locates them between the national park and the housing. Such an arrangement both locates the commercial facilities near their tourist market and isolates the housing from more active movement zones. The industrial and warehousing uses are placed away from residential, retail and tourist activity. The adequacy of this physical separation depends on the specific industrial activities involved. Likewise, the compatibility of industrial and institutional uses also depends on the nature of the industrial firms. A definitive evaluation of the compatibility of industrial uses requires knowledge of the specific types of industries and firms to be located at the site.

The compatibility of the land uses with respect to the larger community of Charlestown is a second concern. The institutional uses are not in conflict with the residential character of the community and might, in fact, be an asset in enhancing the physical appeal of the area. Commercial uses such as the hotel and specialty



TABLE V-16

HOTEL/INDUSTRIAL/HOUSING/INSTITUTIONAL  
DEVELOPMENT PARAMETERS  
CHARLESTOWN

<u>Land Use Category</u>	<u>Square Feet Or Units To Be Developed</u>	
	<u>Rehabilitated Space</u>	<u>New Construction</u>
Institutional		
College	301,155 Sq. Ft.	
College Housing	163,911 Sq. Ft.	
Museum	247,728 Sq. Ft.	
Retail	19,373 Sq. Ft.	
Office/Loft	25,686 Sq. Ft.	
Industry		
Industrial	371,429 Sq. Ft.	130,680 Sq. Ft.
Warehousing	544,079 Sq. Ft.	
Housing/Hotel		
Housing		500 Units
Hotel		400 Rooms
Retail		60,627 Sq. Ft.
Marina		200 Slips

Source: Wallace, Floyd, Ellenzweig, Inc.; et al.

SELECTED HOUSING STOCK CHARACTERISTICS,  
CITY OF BOSTON AND SELECTED COMMUNITIES  
1970

TABLE V-17

	<u>Total Housing Units</u>	<u>Occupied Units</u>		<u>Renter Occupied Units</u>		<u>Owner Occupied Units</u>	
		<u>Number</u>	<u>Percent of Total</u>	<u>Number</u>	<u>Percent of Occupied</u>	<u>Number</u>	<u>Percent of Occupied</u>
City of Boston	232,448	217,622	93.6%	158,392	72.8%	59,230	27.2%
Charlestown	5,119	4,815	94.1%	3,256	67.6%	1,559	32.4%
South Boston	14,259	13,375	93.8%	9,916	74.1%	3,459	25.9%

Source: 1970 Census of Population and Housing; Boston Redevelopment Authority; and  
Economics Research Associates.

shopping complement the national park area adjacent to the site. Industrial uses call for physical and environmental concerns discussed elsewhere in this report. The careful selection and placement of industrial uses on the site, however, need not adversely influence the marketability of the other land use elements. The selection of industrial users should be given careful consideration, nonetheless.

#### Marketability and Phasing

The likely market support for the various use components of the housing and industry alternative depends on market conditions at the time of development, which is several years in the future. The commercial uses contemplated, however, are relatively small in scale, at least for the income generating uses of hotel, retail, and office. The support for public uses such as a museum depends on the identification of specific users and attracting them to the site, and for this reason is not subject to direct market analysis. The hotel, retail and office components could be absorbed within three years time from their availability for initial occupancy.

The attainment of complete occupancy of the industrial space will require a vigorous marketing effort since the market for industrial space in Boston has not been strong in recent years. Multiple tenants will have to be found, and the entire development package made attractive enough to lure potential users from going to other sites. Economics Research Associates has assumed a five year leasing period from the time space is available for occupancy until all available space at Charlestown is occupied. This absorption pace, including some marketing prior to the actual availability of space, represents an average annual absorption of approximately 100,000 square feet per year. This scale of marketing requires the creation of a dynamic industrial environment not presently found in the area. However, the marketing effort required will not be as great as if the entire site were devoted to industrial use.

The market for housing is estimated to be slow in the initial year, as public acceptance and awareness of the new environment to be created will have to be attained gradually. Economics Research Associates has assumed a four year marketing effort for the 500 units, which is considerably less than the absorption experience

elsewhere in the City and represents a highly realistic level of marketing. The general housing situation which indicates the trends in residential development in Boston is summarized in the following paragraphs.

Characteristics of the Existing Stock. As of 1970, the census reports 232,448 housing units in the City of Boston. Selected characteristics of the housing stock for the City, Charlestown, and South Boston are displayed on Table V-17. Nearly 94 percent of the City's dwellings were occupied, with nearly three-fourths of these occupied units being rentals. Of the total housing stock in the City, 59,230 units were owner-occupied.

In Charlestown as of 1970, the census reports 5,119 housing units, with 4,815 units occupied. Slightly over two-thirds of these occupied units are renter-occupied, for a total of 3,256. South Boston data reveals an even higher percentage of renter occupancy, with over 74 percent of the 13,375 occupied units being rented.

Trends in Development and Financing. The type of new residential unit being constructed within the City of Boston has changed substantially over the last decade. The development of new single family detached homes has declined dramatically while multi-family units have increased in both numerical and percentage terms. The trends in building permit activity, a close proxy for actual construction volume, are given in Table V-18. The total number of units authorized has increased from 1,529 in 1960 to 2,270 in 1972. Recent annual data show in excess of 2,000 new dwelling units authorized annually. Within this context of overall activity, changes have occurred in the composition of activity. New single family dwellings have almost stopped, with only 36 permits authorized in 1971. Meanwhile, multi-family permits have increased. In percentage terms, multi-family units now account for over 95 percent of all permits issued.

In the last four years (1970 to 1973), 8,205 dwelling units have been completed in Boston. The annual volume of housing production, then, is currently 2,100 units per year. The detailed annual data, as well as breakdowns of the total by type of financing, is presented in Table V-19. As shown, 6,235 of the units completed in the last four years have been publicly assisted,

NUMBER OF NEW DWELLING UNITS AUTHORIZED BY  
BUILDING PERMITS, BY STRUCTURE TYPE, CITY OF BOSTON,  
1960-1972

TABLE V-18

Year	Single Family	Duplex	Multi-Family	Total	Multi-Family As a Percent of Total
1960	383	38	1,108	1,529	72.5%
1961	339	72	1,333	1,744	76.4%
1962	383	66	1,920	2,369	81.0%
1963	358	266	3,408	4,032	84.5%
1964	778	498	8,773	10,049	87.3%
1965	106	142	3,178	3,426	92.8%
1966	127	30	1,135	1,292	87.8%
1967	234	98	1,485	1,817	81.7%
1968	97	48	4,261	4,406	96.7%
1969	49	134	2,498	2,681	93.2%
1970	30	20	1,998	2,048	97.6%
1971	36	56	2,019	2,111	95.6%
1972	n. a.	n. a.	n. a.	2,270	n. a.

Source: Building Department; and Economics Research Associates.

ANNUAL HOUSING PRODUCTION, BY TYPE OF FINANCING,  
CITY OF BOSTON, 1960-1973

TABLE V-19

Year	Dwelling Units Completed			Private	Total	Publicly Assisted as a Percentage of Total
	Publicly Assisted		Subtotal			
	Boston Housing Authority	Sec. 236/ MHFA				
1960	---	---	---	245	245	0.0%
1961	---	108	108	789	897	12.0
1962	560	257	817	616	1,433	57.0
1963	82	120	202	914	1,116	18.1
1964	---	82	82	2,002	2,084	3.9
1965	---	388	388	3,637	4,025	9.6
1966	64	---	64	2,375	2,439	2.6
1967	---	2,284	2,284	1,883	4,167	54.8
1968	186	274	460	1,706	2,166	21.2
1969	104	497	601	989	1,590	37.8
Subtotal, 1960-69	996	4,010	5,006	15,156	20,162	24.8
1970	208	1,365	1,573	915	2,488	63.2
1971	---	917	917	653	1,570	58.4
1972	252	734	986	---	986	100.0
1973	1,196	1,563	2,759	402	3,161	87.3
Subtotal, 1970-73	1,656	4,579	6,235	1,970	8,205	76.0
Total, 1960-73	2,652	8,589	11,241	17,126	28,367	39.6
Under Construction	510	2,057	2,567	1,239	3,806	67.5
Planned <sup>1/</sup>	65	516	581	386	967	60.1
Proposed <sup>2/</sup>	388	2,897	3,285	2,942	6,227	52.7
Tentative <sup>3/</sup>	368	8,035	8,403	14,354	22,757	36.9

<sup>1/</sup> Planned: If a building permit has been issued, or an FHA or MHFA application approved, a building is listed as planned.

<sup>2/</sup> Proposed: A building is considered proposed when a building permit application is pending, or when an agency (FHA, MHFA, BRA) has received an application or formal proposal.

<sup>3/</sup> Tentative: This category includes everything else that has been mentioned anywhere as a relatively serious prospect for residential development.

Source: Boston Redevelopment Authority.



representing 76 percent of the total production volume.

Privately financed housing in Boston in the last four years has totaled 1,970 units, or slightly under 500 units per year.

In various stages of development are 10,000 additional dwelling units, while numerous other development ideas have been aired. Of all projects that are either under construction, planned, or proposed in the City of Boston, a total of 4,567 market rate housing units will be constructed if all units envisioned are realized.

Development Trends in Charlestown. While City-wide trends yield an indication of overall market conditions and absorption levels, it is important to be aware of specific projects either planned or underway in an area. Since Charlestown appears to be at least worthy of consideration for residential development, Economics Research Associates investigated the current development trends within Charlestown. This subsection briefly summarized current development activity within Charlestown.

The only housing project of any substantial size which is currently under construction in Charlestown is Mishawun Park, a Section 236 subsidized housing project of 337 units. The project is nearly completed, with final completion set for October 1974.

Scattered housing units for the elderly have been constructed recently in Charlestown. The total number of dwellings, however, is only approximately 60 units. The Section 221d(3) subsidized housing project across Medford Street is the largest project in the area, although it has been completed for over three years.

According to the Boston Redevelopment Authority, the only project planned of any size is parcel R-87. A conceptual plan for 40 housing units has received tentative approval, although neither a design nor financing has been finalized as of this writing. The exact nature of this project is yet to be determined, but the units will be geared to the lower spectrum of the private market. A total of approximately 30 other units are in various stages of planning at scattered sites throughout Charlestown.

ANALYSIS OF REPLACEMENT DEMAND FOR DWELLING UNITS  
CITY OF BOSTON  
1960-1973

TABLE V-20

<u>Area</u>	<u>Total Units 1960</u>	<u>New Construction 1960-1973</u>	<u>Demolitions 1960-1973</u>	<u>Total Units 1974</u>	<u>Demolitions as a Percentage of 1960 Inventory</u>
City of Boston <sup>1/</sup>	238,796	28,367	30,641	236,522	12.8%
Charlestown	6,440	366	1,447	5,359	22.5%
South Boston	14,555	356	814	14,097	5.6%

<sup>1/</sup> Total of all Boston Redevelopment Authority Planning Districts within the City of Boston.

Source: Boston Redevelopment Authority; and Economics Research Associates.

TABLE V-21

TRENDS IN HOUSEHOLD SIZE,  
CITY OF BOSTON, CHARLESTOWN, AND SOUTH BOSTON  
1950-1985

<u>Area</u>	<u>1950</u>	<u>1960</u>	<u>1970</u>	<u>1980 <sup>1/</sup></u>	<u>1985 <sup>2/</sup></u>
City of Boston	3.6	2.9	2.7	2.7	2.6
Charlestown	4.5	3.1	3.0	2.9	2.9
South Boston	3.7	3.0	2.7	2.6	2.5

<sup>1/</sup> Boston Redevelopment Authority projection.

<sup>2/</sup> Economics Research Associates estimates.

Source: As noted; U. S. Census.

### Demand for Dwelling Units in Boston and Charlestown

The demand for residential development will come from two sources: new demand caused by population increases and replacement demand caused by demolition of existing units or rehabilitation of the existing stock. The demand for housing is determined in the following paragraphs of this sub-section.

The analysis of replacement demand for dwelling units is shown on Table V-20. As shown, there were 30,641 demolitions in the City of Boston from 1960 to 1973. This figure represents 12.8 percent of the (1960) beginning year inventory. This demolition rate represents approximately one percent per year of the beginning year inventory. For Charlestown, there were 1,447 demolitions during the same period, representing 22.5 percent of the initial year's stock. The annualized percentage figure is approximately 1.7 percent of the 6,440 units in Charlestown in 1960.

Household size trends are shown in Table V-21 for the 1950 to 1960 period, and projected to 1980 and 1985. In keeping with national trends, household size is diminishing, although at a decreasing rate. The very large decrease in household size occurred in the 1950 to 1960 period. Charlestown exemplifies this trend, going from 4.5 persons per household in 1950 to 3.1 persons per household in 1960. ERA estimates the average household size in the City of Boston to be 2.6 in 1985 and 2.9 in Charlestown.

The phasing of the various land use elements of the alternative depends on specific market, financial and physical constraints present as the development progresses. One possible development phasing alternative, used in this analysis, is largely dictated by the physical and administrative time required to demolish existing buildings, prepare the site, select a developer, construct or rehabilitate the space, and actually market the space. All land use components are assumed to begin site clearance in the early project years, with marketing to begin when the structures are ready for occupancy. Alternative phasing configurations, due to market conditions in 1980 or possible noise or other physical impediments to a successful marketing effort, would have to be studied at a later date when other

variables are known. The financial implications of this analysis, however, are not highly dependent upon the exact timing of the marketing of each land use component.

#### Attractiveness of Project for Private Development

Related to the marketability of the project is the expected financial performance of the various development components. To estimate financial performance, Economics Research Associates selected three of the key land uses of a coordinated complex of new construction and rehabilitation in Charlestown and estimated the financial attractiveness of these three elements from the standpoint of the private sector. The two major elements of new construction examined are the 500 housing units and the 400 unit hotel. Also estimated is the rehabilitated industrial space. Due to the deletion of the power plant in this plan the rehabilitation costs for this space is considerably higher than in package A. The expected, or "pro forma", annual financial returns of these uses are computed on the accompanying tables.

As shown on Table V-22, total capital costs for the hotel are estimated at \$12.5 to \$14 million, depending on land costs. Income derived from room revenues, food and beverage sales, telephone and miscellaneous is \$6,388,000 annually, of which 25 percent represents net income before debt service. The loan terms used in this analysis assume a 25 year loan at varying interest rates covering 75 percent of capital costs. The annual cash flow, then, varies from \$525,000 to \$640,000, representing a 15 to 20 percent return on equity. This return is normally considered an acceptable rate for a real estate project of this type and risk.

A similar annual financial statement on Table V-23 for the housing portion of the development produces capital costs of \$15.4 to \$17.4 million, depending on land costs. Total revenues are \$2,234,000, with net income before debt service representing 52 percent of revenues, or \$1,162,000. Assuming various debt service requirements, the annual cash flow ranges from negative values to \$237,000, indicating a return on equity (before incomes taxes) of up to 6 percent. Even the highest return is not normally considered acceptable for this type of project. Nonetheless, other arrangements might be available to make the project more attractive. These methods typically include real estate tax and/or financing considerations which reduce expense items. Under such an arrangement, a project of this type might be made attractive for private de-



TABLE V-22

PRO FORMA ANNUAL FINANCIAL STATEMENT  
HOTEL DEVELOPMENT  
CHARLESTOWN

Item	Measurement Basis	Value at Various Site Acquisition Costs as a Percent of Structures			
		0%	5%	10%	15%
<u>Development Costs</u>					
Structures	400 rooms at \$25,000 per room <sup>1</sup>	10,000,000	10,000,000	10,000,000	10,000,000
Site Acquisition	Percent of structures	0	500,000	1,000,000	1,500,000
Surface Parking	\$700 per space; 0.5 spaces/room	140,000	140,000	140,000	140,000
Furnishings, Fixtures, & Equipment	\$6,000 per room	2,400,000	2,400,000	2,400,000	2,400,000
Total Capital Costs		\$12,540,000	\$13,040,000	\$13,540,000	\$14,040,000
<u>Income<sup>2</sup></u>					
Average Room Rate	\$35 per day				
Annual Occupancy Rate	75%				
Occupied Rooms	300				
Room Revenues	60%	\$3,833,000	\$3,833,000	\$3,833,000	\$3,833,000
Food	26%	1,661,000	1,661,000	1,661,000	1,661,000
Beverage	10%	639,000	639,000	639,000	639,000
Telephone/Miscellaneous	4%	255,000	255,000	255,000	255,000
	100%	\$6,388,000	\$6,388,000	\$6,388,000	\$6,388,000
Net Income Before Debt Service <sup>2</sup>	25% of revenues	\$1,597,000	\$1,597,000	\$1,597,000	\$1,597,000
<u>Debt Service</u>					
	75% loan at 9% for 25 years; constant equals .1018	\$957,000	\$996,000	\$1,034,000	\$1,072,000
Annual Cash Flow		\$640,000	\$601,000	\$563,000	\$525,000
<u>Equity</u>					
Cash Required	25% of capital costs	\$3,135,000	\$3,260,000	\$3,385,000	\$3,510,000
Percent Return on Equity (before income taxes)		20%	18%	17%	15%

<sup>1</sup>Wallace, Floyd, Ellenzweig, Inc.

<sup>2</sup>Harris, Kerr, Forster and Company, Trends in the Hotel-Hotel Business, 1973.

Source: As noted; and Economics Research Associates

PRO FORMA ANNUAL FINANCIAL STATEMENT  
HOUSING DEVELOPMENT  
CHARLESTOWN

TABLE V-23

ITEM	MEASUREMENT BASIS/PERCENT OF GROSS POSSIBLE TOTAL INCOME	VALUE AT VARIOUS LAND COSTS PER SQUARE FOOT			
		\$0	\$1	\$2	\$3
<b>Development Costs</b>					
Structures	500 units at \$30,000 per unit <sup>1/</sup>	\$15,000,000	\$15,000,000	\$15,000,000	\$15,000,000
Land	15 acres	0	\$ 653,000	\$ 1,307,000	\$ 1,960,000
Parking	\$700 per space; <sup>1/</sup> 1.25 spaces/unit	\$ 438,000	\$ 438,000	\$ 438,000	\$ 438,000
<b>Total Capital Costs</b>		\$15,438,000	\$16,091,000	\$16,745,000	\$17,398,000
<b>Income <sup>2/</sup></b>	Average unit rental \$4,200 annually				
Rental Revenues	94%	\$ 2,100,000	\$ 2,100,000	\$ 2,100,000	\$ 2,100,000
Parking	5%	\$ 112,000	\$ 112,000	\$ 112,000	\$ 112,000
Miscellaneous	1%	\$ 22,000	\$ 22,000	\$ 22,000	\$ 22,000
<b>Total Gross Possible</b>	<b>100%</b>	\$ 2,234,000	\$ 2,234,000	\$ 2,234,000	\$ 2,234,000
<b>Expenses <sup>3/</sup></b>					
Payroll, Maintenance,					
Supplies	11%	\$ 246,000	\$ 246,000	\$ 246,000	\$ 246,000
Utilities	9%	\$ 201,000	\$ 201,000	\$ 201,000	\$ 201,000
Management and Administration	9%	\$ 201,000	\$ 201,000	\$ 201,000	\$ 201,000
Taxes and Insurance	19%	\$ 424,000	\$ 424,000	\$ 424,000	\$ 424,000
<b>Total Expenses</b>	<b>48%</b>	\$ 1,072,000	\$ 1,072,000	\$ 1,072,000	\$ 1,072,000
<b>Net Income Before Debt Service <sup>2/</sup></b>	<b>52%</b>	\$ 1,162,000	\$ 1,162,000	\$ 1,162,000	\$ 1,162,000
<b>Debt Service</b>	75% loan for 25 years at:				
	6% (.0797 constant)	\$ 923,000	\$ 962,000	\$ 1,001,000	\$ 1,040,000
	7.5% (.0897 constant)	\$ 1,039,000	\$ 1,083,000	\$ 1,127,000	\$ 1,171,000
	9% (.1118 constant)	\$ 1,179,000	\$ 1,229,000	\$ 1,279,000	\$ 1,328,000
<b>Annual Cash Flow</b>					
6% loan		\$ 239,000	\$ 200,000	\$ 161,000	\$ 122,000
7.5% loan		\$ 123,000	\$ 79,000	\$ 35,000	-
9% loan		\$ -	\$ -	\$ -	\$ -
<b>Equity</b>	25% of capital costs	\$ 3,859,000	\$ 4,023,000	\$ 4,186,000	\$ 4,350,000
Cash Requirement					
Percent Return on Equity (Before Income Taxes)					
6% loan		6%	5%	4%	3%
3% loan		3%	2%	1%	-
9% loan		-	-	-	-

<sup>1/</sup> Wallace, Floyd, Ellensweig, Inc.

<sup>2/</sup> National Association of Realtors, Institute of Real Estate Management, Income/Expense Analysis - Apartments, Condominiums, and Cooperatives, 1973.

velopment. Further, the expense items used here represent averages for existing elevator buildings in Boston. The possibility exists that economies could be achieved in new or rehabilitated units at Charlestown, which would alter expense payments.

As shown by data in Table V-24 the rehabilitated industrial space in this package requires extensive rehabilitation due to the power plant being demolished. With extensive rehabilitation required the rate of return on the industrial space is very low with modest site acquisition costs and good with no acquisition costs. Another factor, however, which effects the feasibility is the vacancy rate factor. With any vacancy approaching 10% the project becomes an unfeasible proposition. As with the industrial space in Package A, an alternative analysis would have to be undertaken to test the feasibility of project financing through an agency like the EDIC. Under these conditions the reuse would probably become more feasible.

PRO FORMA ANNUAL FINANCIAL STATEMENT  
INDUSTRIAL DEVELOPMENT (REHABILITATION ONLY)  
CHARLESTOWN

TABLE V-24

<u>Item</u>	<u>Measurement Basis</u>	<u>Value at Various Site Acquisition Costs as a % of Structure</u>		
		<u>0%</u>	<u>10%</u>	<u>20%</u>
<u>Development Costs</u> <sup>1</sup>				
Structures (Rehabilitation)	\$7/sq.' (1,179,000 sq.)	\$8,253,000	\$8,253,000	\$8,253,000
Site Acquisition Costs	% of structures	0	825,300	1,650,600
Parking	90% of 650 spaces @ \$700/space	409,500	409,500	409,500
Total Capital Costs		8,662,500	9,487,800	10,313,100
Income	\$2/sq.' (1,179,000 sq.)	2,358,000	2,358,000	2,358,000
Income @ 20% vacancy		1,886,400	1,886,400	1,886,400
<u>Expenses</u>				
Maintenance	\$ .40/sq.' (1,179,000 sq.)	471,600	471,600	471,600
Management	\$ .10/sq.'	117,900	117,900	117,900
Taxes and Insurance	\$ .75/sq.'	884,250	884,250	884,250
Total Expenses		1,473,750	1,473,750	1,473,750
<u>Net Income Before Debt Service</u>				
0 vacancy		884,250	884,250	884,250
20% vacancy		412,650	412,650	412,650
<u>Debt Service</u>				
	75% loan for 25 years at:			
	6% (.0797)	517,800	567,133	616,466
	7.5% (.0897)	582,769	638,292	693,814
	9% (.1018)	661,381	724,394	787,405
<u>Annual Cash Flow</u>				
0 vacancy	6% loan	366,450	317,117	267,784
	7.5% loan	301,481	251,153	190,436
	9% loan	222,869	159,856	96,845
20% vacancy	6% loan	105,150	154,483	
	7.5% loan	170,119	225,642	
	9% loan	248,731	311,744	
<u>Equity</u>				
Cash Requirement	25% of capital costs	2,165,625	2,371,950	2,578,275
% return before income taxes (0% vacancy)	6% loan	17%	11%	10%
	7.5% loan	14%	11%	7%
	9% loan	10%	7%	4%

<sup>1</sup>Wallace, Floyd and Ellenzweig, Inc.

Sources: As noted; and Economics Research Associates

TABLE V-25

TOTAL DIRECT REVENUES FROM HOTEL/INDUSTRIAL/HOUSING PACKAGE  
CHARLESTOWN

Revenue Source	Use							Total
	Retail	Office	Industrial	Ware-housing	Housing	Hotel	Marina	
Property Taxes	\$145,200	\$15,800	\$546,900	\$428,100	\$ 975,000	\$650,000	\$16,300	\$2,777,300
Personal Income Taxes	9,200	5,700	52,200	5,700	33,000	2,300	-	108,100
Consumer and Transaction Taxes	31,300	-	-	-	-	3,600	-	34,900
Business Excise Taxes	4,700	2,400	22,300	2,400	-	1,900	-	33,700
Miscellaneous Taxes	-	-	-	-	69,500	156,000	-	225,500
Total	\$190,400	\$23,900	\$621,400	\$436,200	\$1,077,500	\$813,800	\$16,300	\$3,179,500

Source: Economics Research Associates.

#### Annual Direct Revenues At Project Completion

The annual direct revenues from each element of the housing and industry alternative have been calculated for a stabilized year, when the project is completed. The data on revenue sources and computation techniques presented earlier form the basis for these revenue estimates. These revenues are presented on the accompanying table, broken down by revenue source and land use categories. As shown on Table V-25, total direct revenues from the housing and industry development package approximate \$3,200,000 annually. Nearly 60 percent of these revenues are generated by the housing and hotel sectors. The next largest revenue source to the City is from industrial operations. The industrial element provides \$621,000 annually in tax revenue benefits to the City, or 20 percent of the total revenues obtained from the entire housing and industry development packages.

With this alternative as with the others, the importance of the property tax in generating revenue for the City is evident. Nearly \$2,800,000 in annual revenue comes from the property tax. The derivation of this data is found in the Appendix to this report.

#### Annual Expenses at Project Completion

The annual direct expenses for the housing and industry development are presented on the accompanying Table V-26. This data is derived using public services cost data for Boston jurisdictions, as described earlier. The total annual expenses for direct public service costs are approximately \$1,395,000. As expected, the two largest expense categories are for housing and institutional development, the two uses with the largest portion of the building and land area.

In this development alternative and elsewhere, the importance of the non-revenue generating institutional sector is evident. In this case, the museum and college require \$299,000 in direct public service expenses, yet produce no revenues to offset these City expenses. These non-income



TABLE V-26

DIRECT EXPENSES FROM HOTEL/INDUSTRIAL/HOUSING PACKAGE  
CHARLESTOWN

Use	Expense Basis <sup>1/</sup>	Annual Expense
Retail	\$710 per 1,000 Sq. Ft.	\$ 56,800
Office	\$300 per 1,000 Sq. Ft.	7,700
Industrial	\$320 per 1,000 Sq. Ft.	160,700
Warehousing	\$320 per 1,000 Sq. Ft.	174,100
Housing	\$465 per capita	372,000
Hotel	\$710 per 1,000 Sq. Ft.	177,500
Marina <sup>2/</sup>	\$100 per Slip	20,000
Institutional	\$420 per 1,000 Sq. Ft.	299,400
Subtotal		\$1,268,200
Common Area Charges and Contingency (10%)		\$ 126,800
Total		\$1,395,000

<sup>1/</sup> Based on Boston Municipal Research Bureau and Abt Associates, The Effect of High Density Development on Municipal Finances in the City of Boston, April, 1974.

<sup>2/</sup> ERA estimate; exact costs would have to be determined separately.

Source: As noted; and Economics Research Associates.

DIRECT REVENUES FROM HOTEL/INDUSTRIAL/HOUSING/INSTITUTIONAL ALTERNATIVE  
CHARLESTOWN  
1977-2026  
(Thousands of Dollars)

TABLE V-27

Use	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	Total: 1987-2026	Total: 1977-2026
Retail	0	0	46	118	190	190	190	190	190	190	190	7,600	8,904
Office	0	0	24	24	24	24	24	24	24	24	24	960	1,152
Industrial	0	0	124	249	372	497	621	621	621	621	621	24,840	28,566
Warehousing	0	89	175	261	349	436	436	436	436	436	436	17,440	20,494
Housing	0	0	215	539	862	1,078	1,078	1,078	1,078	1,078	1,078	43,120	50,126
Hotel	0	0	0	407	814	814	814	814	814	814	814	32,560	37,851
Marina	0	0	8	16	16	16	16	16	16	16	16	640	760
Institutional/Other	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	89	592	1,614	2,627	3,055	3,179	3,179	3,179	3,179	3,179	127,160	147,853
Present Value of Total Discounted at													
6 percent	0	75	469	1,206	1,852	2,032	1,995	1,882	1,775	1,675	1,580	25,198	38,159
8 percent	0	71	435	1,098	1,655	1,783	1,718	1,590	1,472	1,363	1,262	16,258	27,443
10 percent	0	67	404	1,002	1,483	1,568	1,483	1,348	1,226	1,114	1,013	10,896	20,591

Source: Economics Research Associates.

producing elements of all alternatives, and especially the industrial/institutional and housing/industrial/institutional alternatives, adversely affect the financial returns from the project to the City.

#### Direct Benefits and Costs Over the Life of the Project

To assess the total impact of a development project, the revenues and expenses over the entire useful life of the development must be determined. In this way, the total project impact, from construction to final occupancy, can be measured. In this analysis, the project is assumed to have a useful life of 40 years, with development occurring in the 10 years preceding the beginning of the project life. Development is assumed to begin in 1977, with project completion in 1986 and the useful life running until 2,026.

The accompanying Table V-27 identifies the direct revenues from housing and industrial development of the Charlestown Navy Yards site. The revenues are prorated during the construction years, according to the percentage of the project completed. The phasing corresponds to that discussed earlier under the marketability and phasing section. Total direct revenues in a stabilized year are \$3,179,000, with revenues beginning in 1978 at \$89,000. The total revenues over the project life approximate \$148,000,000.

To take into consideration the timing of the receipt of revenues and the occurrence of expenses, the revenues and expenses must be reduced to a common denominator. This reduction, or discounting, expresses dollar amounts in current (1974) dollars, or present value terms. The exact size of the discount rate that is appropriate depends on many factors and is the topic of continuing academic debate. For this analysis, three discount rates are given, varying from 6 to 10 percent. For public projects involving long term benefits and requiring substantial initial costs, the 6 percent rate is perhaps most appropriate. At a discount rate of 6 percent, the total benefits over the life of the project are \$38,159,000.

The following Table V-28 presents the analysis of public expenditures needed for the housing and industrial development. As examined earlier, these costs include direct public service ex-

PUBLIC EXPENDITURES FROM HOTEL/INDUSTRIAL/HOUSING/INSTITUTIONAL ALTERNATIVE  
CHARLESTOWN  
1977-2026 (Thousands of Dollars) TABLE V-28

Expense Item	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	Total: 1987-2026	Total: 1977-2026
Direct Public Service Expenses													
Retail	0	0	14	35	57	57	57	57	57	57	57	2,280	2,671
Office	0	0	8	8	8	8	8	8	8	8	8	320	384
Industrial	0	0	32	65	96	129	161	161	161	161	161	6,440	7,406
Warehousing	0	35	70	105	140	174	174	174	174	174	174	6,960	8,180
Housing	0	0	74	186	298	372	327	372	372	372	372	14,880	17,298
Hotel	0	0	0	89	177	177	177	177	177	177	177	7,080	8,231
Marina	0	0	10	20	20	20	20	20	20	20	20	800	950
Institutional	0	49	132	181	299	299	299	299	299	299	299	11,960	14,116
Other	0	8	34	69	110	124	127	127	127	127	127	5,080	5,933
Total	0	92	374	758	1,205	1,360	1,395	1,395	1,395	1,395	1,395	55,800	65,169
General Administrative Costs 1/	0	50	201	408	649	732	751	751	751	751	751	30,040	35,084
Site Utilities, Pier Demolition and Repair, Costs External to the Site 2/	1,645	1,645	1,645	-	-	-	-	-	-	-	-	-	4,935
Maintenance of Existing Facilities 3/	490	476	399	241	85	19	0	0	0	0	0	-	1,710
Total Costs	2,135	2,263	2,619	1,407	1,939	2,111	2,146	2,146	2,146	2,146	2,146	85,840	106,898
Present Value of Costs Discounted at													
6 percent	1,900	1,900	2,074	1,051	1,367	1,404	1,346	1,270	1,198	1,130	1,066	17,010	31,650
8 percent	1,830	1,796	1,925	958	1,222	1,232	1,159	1,074	994	920	852	10,975	24,085
10 percent	1,764	1,700	1,789	874	1,095	1,083	1,001	910	827	752	684	7,356	19,151

1/ General administrative costs represents residual expense item, with direct public service costs equaling 65 percent of total costs.  
 2/ From estimates by Wallace, Floyd, Ellensweig, Inc.; Booz, Allen, Hamilton; Bartoo, Aschman.  
 3/ City operating expenses incurred to maintain existing facilities, based on a percentage of project completed. These costs do not include holding costs of the development agency.

Sources: As noted, and Economics Research Associates.

penses, general administrative costs, and costs to maintain the existing facilities during the construction period. In addition, there are special site improvement costs for utilities, pier demolition and repair, and resolution of external access problems. The total annual costs are estimated at \$2,146,000 for each stabilized year. Site improvement costs amount to \$4,935,000, while the existing facilities will cost over \$1,700,000 to maintain during the construction period.

Total costs over the life of the project, then, are \$106,898,000. These costs, when discounted at 6 percent, amount to \$31,650,000. Of note here are the substantial costs for non-revenue generating uses and the large "front end" costs for site improvements. These costs reduce the sizable benefits produced by the income-generating sectors.

An alternate approach is to delete the site improvement costs from the analysis because these costs are capital and not operating costs. These costs would be born by the development group or as city capital costs depending on the nature of the development process. When this adjustment is made the public expenditures over the life of the project are as follows:

TOTAL EXPENSE ITEM	\$101,963,000
Present Value of Costs	
Discounted at 6%	\$27,405,000
8%	\$20,040,000
10%	\$15,292,000

These two approaches give benefit/cost ratios of 1.38 without site improvements and 1.21 with site improvements, discounted at 6%. The Benefit/Cost ratio is derived by dividing total project revenue by total project expenditures.

#### Employment and Payrolls

In addition to the direct revenue benefits accruing to the City of Boston from the development of the Navy yards, the project will contribute additional indirect benefits to the regional economy. There will be benefits generated by the construction-related employment and payrolls during development phasing and also benefits from the operational or permanent employment opportunities created. These benefits, in turn, influence and expand the entire regional



TABLE V-29

DEVELOPMENT COST ESTIMATES FOR  
HOTEL/INDUSTRIAL/HOUSING ALTERNATIVE  
CHARLESTOWN

<u>Site Improvement</u>	<u>Total Demolition and Construction Costs</u>
<u>Access</u>	\$ 778,000
<u>Institutional</u>	
College	\$ 7,529,000
College Housing	3,772,000
Museum	5,202,000
Retail	232,000
Office/Loft	308,000
Parking	3,450,000
Open Space	935,000
Subtotal	<u>\$21,428,000</u>
<u>Industry</u>	
Industrial	\$ 4,691,000
Warehousing	272,000
Parking/Service	-
Subtotal	<u>\$ 4,963,000</u>
<u>Housing/Hotel</u>	
Housing	\$16,142,000
Hotel	10,486,000
Retail	2,001,000
Marina	250,000
Parking	2,969,000
Open Space	721,000
Subtotal	<u>\$32,569,000</u>
<u>Total</u>	<u>\$59,738,000</u>

Source: Wallace, Floyd, Ellenzweig, Inc.

TABLE V-30

CONSTRUCTION RELATED PAYROLL AND EMPLOYMENT GENERATED  
HOTEL/INDUSTRIAL/HOUSING PACKAGE  
CHARLESTOWN

	1977 - 1986	
	Total	Average Annual
Total Costs for Demolition, Rehabilitation, and New Construction (in thousands) <sup>1/</sup>	\$59,738	\$5,974
Construction Related Payroll (in thousands) <sup>2/</sup>	\$26,882	\$2,688
Jobs at \$13,000 per Man-Year <sup>3/</sup>	2,068	207

<sup>1/</sup> Includes utility and pier improvement costs of \$4,935,000, broken down as follows: site utilities (\$2,950,000); pier demolition (\$180,000); pier repair (\$1,085,000); and transportation costs external to the site (\$720,000).

<sup>2/</sup> Equal to 45% of construction expenditures.

<sup>3/</sup> Average wage in the construction industry in 1972 was \$11,181, according to the Massachusetts Division of Employment Security; 1974 rate reflects inflation and real wage rate growth.

Source: Economics Research Associates.

economy. Further, the expenditures made on the site increase regional income and employment through the multiplier effect.. Not all benefits can be quantified.

Nonetheless, this section identifies and outlines the types and magnitudes of benefits derived from the reuse of the Charlestown Navy Yards for housing and industrial development.

The development of the Navy Yards will create employment opportunities both during construction and throughout the operational life of the facilities. The magnitude of the employment, and resultant payrolls, will vary with the specific components of the development alternatives. The following sub-sections outline the relative merits of the housing and industry development alternative in terms of construction and operational employment created.

Development Costs. Prior to an examination of employment generation, the development costs for industrial and housing development must be estimated. Subsequent estimates of the impact of the project depend on the extent of these expenditures. As shown on the accompanying Table V-29, development costs for the industrial and housing program are estimated at \$59,738,000. These cost estimates include demolition, rehabilitation, and new construction within the site itself. Other costs not listed here would also be incurred to improve the site in general, increase transportation access, and provide utilities. These additional costs are included in the analysis that follows.

Construction-Related Employment. The on-site construction-related employment is estimated based on the total construction expenditures of the project. Based on experience, construction-related payrolls have equalled approximately 45 percent of direct construction costs. This total payroll figure can be converted to an estimation of the number of construction jobs generated by assuming an average wage per construction worker. The Massachusetts Division of Employment Security has determined the average wage in the construction industry in Massachusetts. After adjusting this figure to reflect both inflation and growth in real income, the resultant average wage, used in this analysis, is \$13,000 per year.

The construction period is taken at 10 years. The number of jobs per man-year can then be computed on a total and average annual basis. This analysis is performed on the following Table V-30, yielding a total of 2,068 jobs created during the entire construction period of the housing and industrial project. This total converts to 207 jobs per year.

Operational-Related Employment. Employment and payrolls generated as a result of the operation of the industrial and housing facilities cannot be determined precisely until the specific tenants and the exact sizing parameters and operating procedures are established. Nonetheless, certain planning standards and stabilization data from similar land use facilities are available for estimating operational employment. These standards generally relate employment to space usage. Applying these standards to the separate components of the industrial/housing development under

consideration yields the operational data found on the following Table V-31. As shown, the project creates 1,424 permanent employment opportunities. The total yearly payroll from these jobs is nearly \$14 million.

The Employment Multiplier. The multiplier is an economic phenomenon created when outside or new dollars are injected into the economy. The multiplier identifies how many times each new dollar is spent and respent within the local economy. The magnitude of the multiplier is contingent upon the economic self-sufficiency of the area. The impact of construction and operational employment on the regional economy can be analyzed in terms of the employment multiplier.

The employment multiplier quantifies the relationship between a one-unit change in basic employment and the resultant change in supportive employment in the other sectors of the economy. As analysis of the size of the employment multiplier was done by Eliahu Romanoff of the Regional Science Research Center for the Lowell metropolitan area. The employment multiplier was found to be 2.52. In Romanoff's words, "...for each employee directly engaged in the preparation and execution of construction-related investments, a total of 2.52 employees will be required in the City, where 1.52 employees represent the added indirect labor requirements associated with the program. Other employment multiplier estimates for mass transit construction and highway construction have resulted in multipliers of basically similar magnitudes. Since multipliers tend to increase in a more urbanized and interdependent economy, the estimate used here of an employment multiplier of 2.5 is regarded as realistic.

Using this figure, the effect of the employment multiplier on the industrial and institutional program is shown on the accompanying Table V-32. The annual impact from construction payrolls is \$5,376,000, while the impact from operational payrolls is \$27,564,000.

Site Preparation Costs of the Project. The purchaser will incur costs to prepare the Charlestown site for development. These costs include capital costs such as utilities, pier improvements, demolition costs, improving access to the site, and operating costs such as maintaining the existing buildings until redevelopment can take place.



TABLE V-31

OPERATIONAL PAYROLL AND EMPLOYMENT GENERATED  
HOTEL/INDUSTRIAL/HOUSING PACKAGE  
CHARLESTOWN

<u>Use</u>	<u>Total Yearly Payroll<sup>1/</sup></u>	<u>Number of Jobs Generated<sup>1/</sup></u>
Industrial	\$ 9,492,000	904
Hotel	\$ 411,000	59
Retail	\$ 1,680,000	240
Marina	\$ 140,000	20
Office	\$ 1,030,000	103
Warehousing	<u>\$ 1,029,000</u>	<u>98</u>
Total	\$13,782,000	1,424

<sup>1/</sup> For standards used for job and payroll generation data, see computations of direct revenues.

Source: Economics Research Associates.

TABLE V-32

ECONOMIC IMPACT OF THE EMPLOYMENT MULTIPLIER  
HOTEL/INDUSTRIAL/HOUSING PACKAGE  
CHARLESTOWN

	<u>Employment</u>	<u>Payrolls</u>	<u>Regional Spending</u>
<u>Construction Related Impact</u>			
Employment			
Total	2,068		
Annual	207		
Payroll			
Total		\$26,882,000	
Annual		\$ 2,688,000	
<u>Operational Impact (Annual)</u>			
Employment	1,424		
Payroll		\$13,782,000	
<u>Multiplier Effect (at 2.5)</u>			
From Construction Payrolls <sup>1/</sup>			\$ 5,376,000
From Operational Employment Payrolls <sup>1/</sup>			\$27,564,000

<sup>1/</sup> Assuming take-home pay represents 80% of payrolls.

Source: Economics Research Associates.

The site preparation costs are broken down as follows:

Site Utilities	\$2,950,000
Pier Demolition	\$ 180,000
Pier Repair	\$1,085,000
Access External to Site	\$ 720,000
Internal Access	\$ 778,000
Building Demolition	\$2,421,000
Total	<u>\$8,134,000</u>

These costs of preparing the site for industrial and housing development should be weighed when considering the attractiveness of the site for reuse.

The above costs do not include costs associated with holding the property until reuse occurs. These costs would be substantial and would include management, maintenance, security and insurance costs. It is likely that these costs would be about \$.45 a sq. ft. of floor area per year for comparable space, or \$1,062,000 per year.



CHARLESTOWN  
PACKAGE C  
HOTEL/CONVENTION/  
HOUSING/  
INSTITUTIONAL

Development Concept

One land use alternative package proposed for Charlestown involves a mixture of residential, commercial, and institutional development. The proposed sizing parameter for the principal land use categories are identified in the following table (V-33). The major elements to be developed by the private sector are 970 housing units and a 1,000 room hotel with a large convention center. Supporting specialty shopping and other commercial facilities are also planned for the site. Institutional uses would include a college and museum. Other land use elements such as parking and open space would also be present, as specified in prior report sections.

The housing element will consist of multi-family luxury units. The average unit size is 1,000 square feet and the average unit price is \$45,000. The 1,000 unit hotel will be a high quality convention hotel, with an average cost of \$40,000 per room. It will be operated in conjunction with the convention center. The retail element will consist of specialty shops somewhat scattered around the hotel and institutional uses. Local shopping needs of on-site residents will be largely served by the recently announced Bunker Hill Mall in Charlestown.

Compatibility of the Land Uses

Two separate issues are relevant in this analysis of the compatibility of a hotel/convention/housing/institutional development alternative for the Charlestown Naval Ship Yard site. The first concern is the general viability of each land use at the Charlestown site, while a separate issue is the interrelationship or complementary nature of the proposed uses. Ideally, the uses selected should not only be viable by themselves, but should reinforce each other so that the total package is both internally balanced and in harmony with the wider community.

The marketability of the uses is examined in the next section. The relationship of each use with respect to Charlestown, and its influence on the community is of equal concern, however. Certainly, high income housing would not disrupt the community. The hotel and convention center would generate activity basically at the Naval Yard site. In sum, some of the land uses proposed would not drastically alter the pattern of living in Charlestown. In fact, there would be spill-over benefits to both the community and Boston, as will be shown later in this section.



The specific land use elements of the development package are compatible with each other and even mutually reinforcing. The hotel, convention center, retail, and office all appeal to portions of the same market, and hence can draw support from each other. The high quality nature of the land uses complement the development of luxury housing at the site, while the housing creates a local market for the speciality retail facilities. The presence of the National Park on a portion of the Naval Ship Yard site creates an attractive setting for quality development, and also generates a substantial tourist market for hotel and retail facilities.

#### Marketability and Phasing

The likely market support for the various use components depends on conditions at the time of development, which is several years in the future. For example, several large hotel projects have been proposed for the City of Boston. Should all of these projects be realized, the market impact might be substantial. In any event, a detailed marketability and feasibility analysis should be undertaken prior to a final development commitment.

At present, it appears that a hotel and convention center could be developed in two stages, with two 500 room structures recommended. Construction could be completed by 1984. The housing units will be marketed over a 5 to 6 year period, with an annualized absorption of approximately 200 units expected after market acceptance is demonstrated. The retail and office components are to be constructed and begin occupancy in the second year of the project, assumed for the analysis to be 1978. New retail space will be added in the projects' third and fourth years. Highlights of the market trends and conditions analysis that prompted the selection of the above market phasing guidelines are presented below. The housing market is summarized in the prior land use package.

Hotel Development. Another major development component of this alternative is a 1,200 room hotel. The expected market support for such a facility in Boston is analyzed in summary form below. For further detail, consult the phase I report of market findings on overnight accommodations in Boston.

In Table V-34, the data on the number of visitors expected to Boston in 1978 is translated into an estimate of room-night demand, based on

TABLE V-33

HOTEL/CONVENTION CENTER/HOUSING/INSTITUTIONAL  
DEVELOPMENT PARAMETERS  
CHARLESTOWN

<u>Land Use Category</u>	<u>Square Feet or Units to be Developed</u>	
	<u>Rehabilitated Space</u>	<u>New Construction</u>
<b>Institutional</b>		
College	302,630 sq. ft.	90,000 sq. ft.
College Housing	191,011 sq. ft.	-
Museum	160,673 sq. ft.	40,000 sq. ft.
Retail	43,257 sq. ft.	-
Office/Loft	148,744 sq. ft.	-
<b>Hotel/Convention Center</b>		
Hotel	-	1,000 rooms
Convention Center	180,000 sq. ft.	60,000 sq. ft.
Marina <sup>1/</sup>	-	-
<b>Housing</b>		
Housing	63,424 sq. ft.	970 units
Community Facilities	27,045 sq. ft.	-

<sup>1/</sup> Space to be occupied is unspecified.

Source: Wallace, Floyd, Ellenzweig, Inc., et al.

TABLE V-34

ESTIMATED DISTRIBUTION OF COMMERCIAL LODGING  
ROOM-NIGHTS BY TRIP TYPE  
BOSTON, 1978

	<u>Pleasure</u>	<u>Business</u>	<u>Massachusetts Residents</u>	<u>Total</u>
Number of Visitors	1,200,000	910,000	1,980,000	4,090,000
Number of Overnight Visitors	948,000	746,200	80,000	1,774,200
<b>Commercial Lodging Factor</b>				
Percent Staying in Commercial Lodging	62%	70%	62%	
(x) Length of Stay	2 nights	2 nights	2 nights	
(÷) Persons per Room	3.2	1.25	3.2	
Equals Number of Room-Nights per Visitor	0.4	1.1	0.4	
Total Room-Nights in Commercial Lodging	379,200	820,820	32,000	1,232,020

Source: Boston Redevelopment Authority, A Special Report on Visitor Projections; and Economics Research Associates.

the traits of Boston visitors found in a recent survey. The total number of room-nights demanded in 1978 is projected at 1,232,000 room-nights. Table V-35 translates this demand into rooms, indicating the number of rooms supportable at 70 percent occupancy. Projections to 1985 are based on a continuation of 1970-1978 expected trends, and do incorporate the permanent impact of the Bicentennial on visitor volume. The demand in 1985 is estimated at approximately 6,500 new rooms.

In addition to this demand for new rooms based on increases in visitor volume, there will also be a replacement demand. This demand will be realized through either actual demolition of older hotel units, or through reduced occupancy rates at lower quality facilities. This replacement demand, coupled with the demand created through increased visitor volume, will result in the need for approximately 9,650 rooms in Boston by 1985, according to this analysis.

It should be cautioned, however, that this analysis assumes the validity of both the total visitation estimates and the other planning parameters which go into the room-night demand equation. As such, the analysis is highly dependent on the reliability of the visitor volume data, which is most difficult to estimate. Further, the final results are very sensitive to the other survey inputs regarding visitor length of stay, party size, etc. A change in the length of stay from two to three nights, for example, increases total demand by 50 percent. For these reasons, ERA also examined market support for a hotel/motel in Charlestown, based on projected visitation to the National Park Service site. This analysis was described previously in the industrial/institutional land use package.

Specialty Shopping. The final major component in this alternative is a specialty shopping area adjacent to the hotel. The concept of a specialty shopping center and some noted examples of specialty shopping centers across the nation and in Boston are described below.

#### The Concept

The specialty center differs from other shopping complexes in two essential ways: (1) a unifying theme is employed in architectural design, which is carried out by each individual component shop; and (2) the specialty center appeals equally to the sightseer or tourist and to the shopper. In

some specialty centers, a third difference may be present: unusual merchandise is offered, which is not generally available.

The primary characteristic differentiating the specialty center from other types of shopping complexes is the fact that a theme of some historical or cultural significance is reflected in design, construction materials, and decorative items. A water orientation or historic prominence of the site often serves to provide this focal point of interest. Although there is no limit to the variety of themes that may be employed, specialty centers may differ in the degree to which their themes are exploited.

A second important distinguishing characteristic of the specialty center is its ability to attract people who are not interested in shopping. The physical appearance of the center in itself should attract the sightseer, while the provision of some kind of entertainment or recreational activity increases its appeal for family outings. In addition, a broad range of quality restaurant offerings adds to the total appeal.

Frequently, the theme of a specialty center is further enhanced by shops carrying merchandise directly related to the theme. For example, specialty centers with a Spanish orientation usually include a shop offering imported hand-carved furniture and accessories. Even the more customary kinds of shops in a center (apparel, shoes, books) may include a few unusual items which generally cannot be purchased elsewhere. This kind of merchandise is offered because the market from which a specialty center draws is a prime market for unique, discretionary income items, a fact which will be amplified subsequently in this section.

While experience elsewhere offers valuable insight into the concept and market acceptance of specialty shopping centers, the support afforded existing specialty shopping areas in Boston provides the best indications of the likely success of specialty shopping in Charlestown. The most notable specialty shopping area currently in operation in the Boston area is at Harvard Square. Other specialty shopping areas are found along Newbury Street, and at the Prudential Center. While precise data on these centers could not be gathered within the time



PROJECTED DEMAND FOR NEW COMMERCIAL LODGING  
IN BOSTON  
1978-1985

	1978	1985 <sup>1/</sup>
<u>Annual Room-Nights</u>		
Pleasure Demand	379,200	511,920
Business Demand	820,820	1,108,107
Massachusetts Resident Demand	32,000	43,200
Total	1,232,020	1,663,227
<u>Supportable Rooms</u>		
Rooms Supportable at 100 Percent Occupancy	3,375	4,557
Rooms Supportable at 70 Percent Occupancy	4,821	6,510

<sup>1/</sup> Assumes continuation of BRA projected 1970-1978 trends, averaging five percent annual growth in visitation, and incorporates impact of Bicentennial on visitor volume.

Source: Boston Redevelopment Authority, A Special Report on Visitor Projections; and Economics Research Associates.

TABLE V-36

ESTIMATED MARKET SUPPORT FOR A SPECIALTY SHOPPING CENTER  
AT CHARLESTOWN  
1985

Market	Population	Estimated Penetration	Estimated Attendance	Retail Sales
Resident Population <sup>1/</sup>	5,325,000	35%	1,863,750	
Tourist <sup>2/</sup>	5,500,000	8%	440,000	
Total Estimated Attendance			2,303,750	
Estimated Per Capita Expenditures <sup>3/</sup>				\$3.25
Estimated Total Sales				\$7,487,188

<sup>1/</sup> Estimated from current population of eastern Massachusetts (east of Worcester County) and assuming growth of population averaging 1.5 percent per year from 1970 level of 4,260,448.

<sup>2/</sup> Based on continuation of visitation growth trends for 1970-1975 from BRA, A Special Report on Visitor Projections, 1973.

<sup>3/</sup> In 1972 dollars; includes spending for merchandise and for food and beverage items.

Source: As noted; and Economics Research Associates.

TABLE V-37

WARRANTED SPECIALTY SHOPPING FACILITIES AT  
CHARLESTOWN  
1985

Estimated Total Sales <sup>1/</sup>	\$7,487,188
Sales Per Square Foot	\$ 90
Supportable Square Feet of Specialty Shopping Area	83,200 sq. ft.

<sup>1/</sup> 1972 Constant Dollars.

Source: Economics Research Associates.

and scope parameters of this study, their observed level of market acceptance appears high.

The Rouse Company is undertaking a restoration of Faneuil Hall Marketplace. Altogether, there will be 354,700 square feet of retail and office space in the Quincey Market building, North Market building, and South Market building. While a detailed plan is yet to be determined, approximately 160,000 square feet will be devoted to office use, leaving approximately 195,000 square feet for retail activities. Approximately 30 percent of the retail space will be devoted to restaurants, with small specialty shops occupying the remaining space. A tentative partial opening date of April 1975, has been set, with completion scheduled by 1976.

The proposed specialty center at the Naval Ship Yard site is expected to draw from two sources of market support, the resident metropolitan Boston population and the tourist market. It is estimated that 35 percent of the greater Boston metropolitan area residents will visit the center. This level of market penetration is in keeping with experiences at other specialty centers, as displayed in Table V-36. It should be emphasized, however, that projections based on experience elsewhere provide only an initial estimate of likely support, and should not be taken as a precise figure. Further, more detailed analysis should be undertaken prior to finalizing a development program.

Tourists visiting Boston will also be attracted to a specialty shopping center at Charlestown. In keeping with experience elsewhere, ERA's initial estimate is an eight percent penetration of the tourist market. As shown in Table V-36, the total estimated sales to the 2.3 million visitors to the Charlestown specialty center is \$7.5 million.

The determination of supportable square feet of specialty shopping is found in Table V-37. Assuming sales per square foot of \$90 - a realistic figure in light of expenditure patterns elsewhere - a total of 83,200 square feet of specialty shopping is warranted at the Charlestown site. A more detailed analysis would have to be undertaken to refine the initial estimate and define other parameters such as tenant types and mix, store sizes, motif, etc.

Attractiveness of Project for Private Development. Related to the marketability of the project is the expected financial performance of the various development components. To estimate financial performance, Economics Research Associates selected three of the key land uses of a coordinated complex of new and rehabilitated construction in Charlestown and estimated the financial attractiveness of these three elements from the standpoint of the private sector. The three major elements examined are the 970 new housing units, and the 1,000 unit hotel, and the specialty shopping development. The expected, or "pro forma", annual financial return of these three uses are computed on the accompanying tables.

As shown on the table (V-38), total capital costs for the hotel are estimated at from \$46.4 to \$52.4 million, depending on land costs. Income derived from room revenues, food and beverage sales, telephone and miscellaneous is \$25,093,000 annually, of which 25 percent represents net income before debt service. The loan terms used in this analysis assume a 25 year loan at 9 percent interest covering 75 percent of capital costs. The annual cost flow, then, ranges from \$2.3 to \$2.7 million, representing a 17 to 24 percent return on equity. This return is normally considered an acceptable rate for a real estate project of this type and risk.

A similar annual financial statement on Table V-39 for the housing portion of the development produces capital costs of from \$44.7 to \$48.6 million, depending on land costs. Total revenues are \$6,811,000, with net income before debt service representing 52 percent of revenues, or \$3,542,000 assuming the varying debt service requirements, the annual cash flow ranges from negative values to \$872,000, indicating a return on equity (before income taxes) of up to 8 percent. Even the highest return is not normally considered acceptable for this type of project. Nonetheless, other financing methods might be available to make the project more attractive. These methods typically include other real estate tax and/or financing considerations which reduce expense items. Under such an arrangement, a project of this type might be made attractive for private development. Further, the expense items used in this analysis represent averages for existing elevator buildings in Boston. The possibility exists that economics could be achieved in new or re-

PRO FORMA ANNUAL FINANCIAL STATEMENT  
HOTEL DEVELOPMENT  
CHARLESTOWN

TABLE V-38

Item	Measurement Basis	Value at Various Land Costs as a Percent of Structures			
		0%	5%	10%	15%
<u>Development Costs</u>					
Structures					
Land	1,000 rooms at \$40,000 per room <sup>1</sup>	\$40,000,000	\$40,000,000	\$40,000,000	\$40,000,000
Surface Parking	percent of structures	0	2,000,000	4,000,000	6,000,000
Furnishing, Fixtures, & Equipment	\$700 per space; 0.5 spaces per room	350,000	350,000	350,000	350,000
	\$6,000 per room	6,000,000	6,000,000	6,000,000	6,000,000
Total Capital Costs		\$46,350,000	\$48,350,000	\$50,350,000	\$52,350,000
<u>Income<sup>2</sup></u>					
Average Room Rate	\$55 per day				
Average Occupancy Rate	75%				
Occupied Rooms	750				
Room revenues	60%	\$15,056,000	\$15,056,000	\$15,056,000	\$15,056,000
Food	26%	6,524,000	6,524,000	6,524,000	6,524,000
Beverage	10%	2,509,000	2,509,000	2,509,000	2,509,000
Telephone/Miscellaneous	4%	1,004,000	1,004,000	1,004,000	1,004,000
	100%	\$25,093,000	\$25,093,000	\$25,093,000	\$25,093,000
Net Income Before Debt Service <sup>2</sup>	25% of revenues	\$6,273,000	\$6,273,000	\$6,273,000	\$6,273,000
<u>Debt Service</u>					
	75% loan at 9% for 25 years; constant equals .1018				
Annual Cash Flow		\$3,539,000	\$3,692,000	\$3,844,000	\$3,997,000
Equity		\$2,734,000	\$2,581,000	\$2,429,000	\$2,276,000
Cash Required	25% of capital costs	\$11,588,000	\$12,088,000	\$12,587,000	\$13,088,000
Percent Return on Equity (before income taxes)		24%	21%	19%	17%

<sup>1</sup>Wallace, Floyd, Ellenzweig, Inc.

<sup>2</sup>Harris, Kerr, Forster and Company, Trends in the Hotel-Motel Business, 1973.

Source: As noted; and Economics Research Associates



PRO FORMA ANNUAL FINANCIAL STATEMENT  
HOUSING DEVELOPMENT  
CHARLESTOWN

TABLE V-39

ITEM	MEASUREMENT BASIS/PERCENT OF GROSS POSSIBLE TOTAL INCOME	VALUE AT VARIOUS LAND COSTS PER SQUARE FOOT			
		\$0	\$1	\$2	\$3
<u>Development Costs</u>					
Structures	970 units at \$45,000 per unit <sup>1/</sup>	\$43,650,000	\$43,650,000	\$43,650,000	\$43,650,000
Land	30 acres	0	\$ 1,307,000	\$ 2,614,000	\$ 3,920,000
Parking	\$700 per space, <sup>1/</sup> 1.5 spaces/unit	\$ 1,019,000	\$ 1,019,000	\$ 1,019,000	\$ 1,019,000
Total Capital Costs		\$44,669,000	\$45,976,000	\$47,283,000	\$48,589,000
<u>Income <sup>2/</sup></u>	Average unit rental \$6,600 annually				
Rental Revenues	94%	\$ 6,402,000	\$ 6,402,000	\$ 6,402,000	\$ 6,402,000
Parking	5%	\$ 341,000	\$ 341,000	\$ 341,000	\$ 341,000
Miscellaneous	1%	\$ 68,000	\$ 68,000	\$ 68,000	\$ 68,000
Total Gross Income	100%	\$ 6,811,000	\$ 6,811,000	\$ 6,811,000	\$ 6,811,000
<u>Expenses <sup>2/</sup></u>	48%	\$ 3,269,000	\$ 3,269,000	\$ 3,269,000	\$ 3,269,000
<u>Net Income Before Debt Service <sup>2/</sup></u>	52%	\$ 3,542,000	\$ 3,542,000	\$ 3,542,000	\$ 3,542,000
<u>Debt Service</u>	75% loan for 25 years at:				
	6% (.0797 constant)	\$ 2,670,000	\$ 2,748,000	\$ 2,826,000	\$ 2,904,000
	7.5% (.0897 constant)	\$ 3,005,000	\$ 3,093,000	\$ 3,180,000	\$ 3,269,000
	9% (.1018 constant)	\$ 3,411,000	\$ 3,510,000	\$ 3,610,000	\$ 3,710,000
<u>Annual Cash Flow</u>					
6% loan		\$ 872,000	\$ 774,000	\$ 716,000	\$ 638,000
7.5% loan		\$ 537,000	\$ 449,000	\$ 362,000	\$ 273,000
9% loan		\$ 131,000	\$ 32,000	-	-
<u>Equity</u>	25% of capital costs				
Cash Requirement		\$11,167,000	\$11,494,000	\$11,821,000	\$12,147,000
Percent Return on Equity (Before Income Taxes)					
6% loan		8%	7%	6%	5%
7.5% loan		5%	4%	3%	2%
9% loan		1%	-	-	-

<sup>1/</sup> Wallace, Floyd, Ellenzweig, Inc.

<sup>2/</sup> National Association of Realtors, Institute of Real Estate Management, Income/Expense Analysis - Apartments, Condominiums, and Cooperatives, 1973.

Source: As noted, and Economics Research Associates.

habilitated units at Charlestown, which would alter expense payments.

Data shown in Table V-40 shows the pro forma statement for a specialty shopping center, and indicates that with minimal site acquisition costs the percent return on equity borders on an acceptable range. The costs used in this analysis indicate that with cost controls the specialty shopping area could be made attractive to the private sector.

Annual Direct Revenues at Project Completion.  
The direct revenues from six land use elements have been calculated for the housing, convention center, and hotel package. The elements are residential, retail, hotel and convention center, movie, and offices. The details of the revenue sources and the derivation of the data is given in the appendix. The results are summarized in the following table V-41.

PRO FORMA ANNUAL FINANCIAL STATEMENT  
SPECIALTY SHOPPING CENTER  
CHARLESTOWN

TABLE V-40

<u>Item</u>	<u>Measurement Basis</u>	<u>Value at Various Site Acquisition Costs as a Percent of Structures</u>		
		<u>0%</u>	<u>10%</u>	<u>20%</u>
<u>Development Costs</u>				
Structures	New construction, \$33/sq. ft.; 1 rehabilitation, \$12/sq. ft.	\$2,208,000	\$2,208,000	\$2,208,000
Site Acquisition	Percent of structures	-	220,800	441,600
Parking	\$700/ space; 535 spaces	374,500	374,500	374,500
		\$2,582,500	\$2,803,300	\$3,024,100
<u>Income</u>	9.3% of annual sales of \$90/sq. ft.	661,230	661,230	661,230
<u>Expenses</u>				
Building Manintance	\$ .15/sq. ft.	46,610	46,610	46,610
Insurance	2% of revenue	142,200	142,200	142,200
General Administretion	\$ .30/sq. ft.	23,700	23,700	23,700
Real Estate Tax	6% of value	145,080	158,328	171,576
Security	\$ .45/sq. ft.	35,550	35,550	35,550
Common Area Parking Maintenance	\$ .06/sq. ft.	6,000	6,000	6,000
		399,140	412,388	425,636
<u>Net Income Before Debt Service</u>		262,090	248,842	235,594
<u>Debt Service</u>				
	75% loan for 25 years at:			
	6% (.0797 constant)	154,369	167,567	180,766
	7.5% (.0897 constant)	173,738	188,592	203,446
	9% (.1018 constant)	197,174	214,032	230,890
<u>Annual Cash Flow</u>				
6% loan		107,721	81,275	54,828
7.5% loan		88,352	60,250	32,148
9% loan		64,916	34,810	4,704
<u>Equity</u>				
	25% of capital costs			
Cash requirement		604,500	659,700	714,900
8% return on equity before income taxes		18%	12%	8%
6% loan		15%	9%	4%
7.5% loan		11%	5%	.7%
9% loan				

<sup>1</sup> Wallace, Floyd & Ellenzweig.  
Sources: As noted, and Economics Research Associates.

TABLE V- 41

TOTAL DIRECT REVENUES FROM HOUSING/CONVENTION CENTER/HOTEL PACKAGE  
CHARLESTOWN

Revenue Source	Use					Total
	Residential	Retail	Hotel/Conven- tion Center	Marina	Office	
Property Taxes	\$2,837,300	\$162,500	\$2,927,600	\$13,000	\$ 86,200	\$6,026,600
Personal Income Taxes	102,400	12,000	10,000	-	32,700	157,100
Consumer and Transaction Taxes	-	40,400	7,200	-	-	47,600
Business Excise Taxes	-	6,600	6,800	-	14,000	27,400
Miscellaneous Taxes	230,500	-	546,100	-	-	776,600
Total	\$3,170,200	\$221,500	\$3,497,700	\$13,000	\$132,900	\$7,035,300

Source: Economics Research Associates.

**DIRECT EXPENSES FROM HOUSING/CONVENTION CENTER/HOTEL PACKAGE  
CHARLESTOWN**

<u>Use</u>	<u>Expense Basis <sup>1/</sup></u>	<u>Annual Expense</u>
Residential	\$465 per capita	\$ 721,700
Retail	\$710 per 1,000 sq. ft.	73,300
Hotel/Convention Center	\$710 per 1,000 sq. ft.	411,800
Marina <sup>2/</sup>	\$100 per slip	20,000
Office	\$300 per 1,000 sq. ft.	44,600
Institutional	\$420 per 1,000 sq. ft.	<u>274,800</u>
Subtotal		\$1,546,200
Common Area Charges plus Contingency (10%)		<u>154,600</u>
Total		\$1,700,800

1/ Based on Boston Municipal Research Bureau and Abt Associates,  
The Effect of High Density Development on Municipal Finances in the  
City of Boston, April 1974.

2/ ERA estimate; exact costs would have to be studied separately.

Source: As noted, and Economics Research Associates.

The total direct revenues at project completion are approximately 7 million dollars annually, expressed in 1974 dollars. These revenues are drawn substantially from property taxes, but personal income taxes, consumer and transaction taxes, business excise taxes, and miscellaneous taxes also contribute to the revenue. The two largest contributions to revenue are made by residential development and the hotel/convention center. Each of these uses contribute over \$3 million dollars annually.

Annual Expenses at Project Completion.

The direct public service expenses for the housing/convention center/hotel development are shown on the accompanying Table V-42. At project completion, the estimated direct expenses will be 1.7 million dollars annually. The two largest expenses categories are for residential development services and hotel/convention center services. Here, as with the other alternative development programs, institutional uses add significant amounts to the annual expense outlay. The stabilized institutional expenses are \$275,000 each year, for which no revenues are projected.

**DIRECT REVENUES FROM HOTEL/CONVENTION/HOUSING/  
INSTITUTIONAL ALTERNATIVE  
CHARLESTOWN SITE  
1977-2026  
(Dollars in Thousands)**

TABLE V-43

Use	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	Total: 1987-2026	Total: 1977-2026
Residential	0	0	317	991	1,565	2,219	2,893	3,170	3,170	3,170	3,170	126,800	144,235
Retail	0	46	93	189	221	221	221	221	221	221	221	8,840	10,494
Hotel/Convention Center	0	0	0	873	1,749	1,749	1,749	3,498	3,498	3,498	3,498	139,920	156,536
Marina	0	6	13	13	13	13	13	13	13	13	13	520	630
Office	0	33	83	133	133	133	133	133	133	133	133	5,320	6,367
Institutional/Other	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>0</b>	<b>85</b>	<b>506</b>	<b>2,161</b>	<b>3,701</b>	<b>4,335</b>	<b>4,969</b>	<b>7,035</b>	<b>7,035</b>	<b>7,035</b>	<b>7,035</b>	<b>281,400</b>	<b>318,262</b>
<b>Present Value of Total Discounted at</b>													
6 Percent	0	71	401	1,615	2,609	2,883	3,118	4,164	3,928	3,706	3,496	55,761	78,256
8 Percent	0	67	372	1,471	2,332	2,929	3,119	3,259	3,017	2,794	2,579	55,979	78,230
10 Percent	0	64	346	1,342	2,089	2,225	2,318	2,984	2,712	2,466	2,242	24,112	40,658

Source: Economic Research Associates.

**PUBLIC EXPENDITURES FROM HOTEL/CONVENTION/HOUSING/  
INSTITUTIONAL ALTERNATIVE  
CHARLESTOWN SITE  
1977-2026  
(Dollars in Thousands)**

TABLE V-44

Expense Item	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	Total: 1987-2026	Total: 1977-2026
<b>Direct Public Service Expenses for</b>													
Residential	0	0	73	223	372	521	670	722	722	722	722	28,880	32,907
Retail	0	15	31	62	73	73	73	73	73	73	73	2,920	3,466
Hotel/Convention Center	0	0	0	103	206	206	206	412	412	412	412	16,480	18,437
Marina	0	9	20	20	20	20	20	20	20	20	20	800	969
Office	0	11	28	45	45	45	45	45	45	45	45	1,800	2,154
Institutional	0	0	104	183	264	273	273	273	273	273	273	11,000	12,926
Other	0	4	26	63	98	114	129	194	154	154	154	6,160	7,056
<b>Total</b>	<b>0</b>	<b>39</b>	<b>284</b>	<b>699</b>	<b>1,078</b>	<b>1,254</b>	<b>1,418</b>	<b>1,701</b>	<b>1,701</b>	<b>1,701</b>	<b>1,701</b>	<b>68,040</b>	<b>77,915</b>
General Administrative Costs <sup>1/</sup>	0	21	153	376	980	675	764	916	916	916	916	36,640	41,957
Site Utilities, Pier Demolition and Repair, Costs External to the site <sup>2/</sup>	1,812	1,812	1,811	-	-	-	-	-	-	-	-	-	5,435
Maintenance of Existing Facilities <sup>3/</sup>	490	484	495	340	232	188	144	0	0	0	0	0	2,333
<b>Total Costs</b>	<b>2,302</b>	<b>2,356</b>	<b>2,703</b>	<b>1,415</b>	<b>1,890</b>	<b>2,117</b>	<b>2,326</b>	<b>2,617</b>	<b>2,617</b>	<b>2,617</b>	<b>2,617</b>	<b>104,680</b>	<b>127,640</b>
<b>Present Value of Costs Discounted at</b>													
6 Percent	2,049	1,978	2,141	1,057	1,332	1,408	1,459	1,549	1,461	1,379	1,301	20,743	36,556
8 Percent	1,974	1,870	1,987	963	1,191	1,235	1,257	1,309	1,212	1,122	1,039	13,384	27,504
10 Percent	1,902	1,770	1,846	879	1,067	1,086	1,085	1,109	1,009	917	834	8,969	21,639

<sup>1/</sup> General administrative cost represents residual, with direct public service costs equalling 65 percent of total costs.

<sup>2/</sup> From estimates by Wallace, Floyd, Ellensweig, Inc.; Boos, Alleg, Hamilton; Barton-Aeschmao Associates.

<sup>3/</sup> City operating expenses incurred to maintain existing facilities; based on a percentage of project completed. These costs do not include holding costs of the development agency.

Source: As noted; and Economic Research Associates.



DEVELOPMENT COST ESTIMATES FOR  
HOUSING/CONVENTION CENTER/HOTEL ALTERNATIVE  
CHARLESTOWN

<u>Site Improvement</u>	<u>Total Demolition and Construction Costs</u>
<u>Access</u>	\$ 379,000
<u>Institutional</u>	
College	\$ 12,455,000
College Housing	3,907,000
Museum	4,814,000
Retail	519,000
Office/Loft	1,685,000
Parking	1,365,000
Open Space	<u>1,030,000</u>
Subtotal	\$ 25,775,000
<u>Hotel/Convention Center</u>	
Hotel	\$ 40,781,000
Convention Center	5,040,000
Retail	1,980,000
Parking	5,828,000
Marina	200,000
Open Space	<u>756,000</u>
Subtotal	\$ 54,585,000
<u>Housing</u>	
Housing	\$ 46,304,000
Community Facilities	406,000
Open Space	<u>375,000</u>
Subtotal	\$ 47,085,000
<u>Total</u>	<u>\$127,824,000</u>

Source: Wallace, Floyd, Ellenzweig, Inc.

Direct Benefits and Costs Over the Life of the Project.

To assess the total impact of a development project, the revenues and expenses over the entire useful life of the development must be determined. In this way the total project impact, from construction to final occupancy, can be measured. In this analysis, the project is assumed to have a useful life of 40 years, with development occurring in the 10 years preceding the beginning of the project life. Development is assumed to begin in 1977, with project completion in 1986 and the useful life running until 2026.

The accompanying Table V-43 identifies the direct revenues from a mixture of housing, hotel, convention center, and institutional development of the Charlestown Naval Yard site. The revenues are prorated during the construction years, according to the percentage of the project completed. The phasing corresponds to that discussed earlier under the marketability and phasing section. Total direct revenues in a stabilized year are \$7,035,000, with revenues beginning in 1979 at \$85,000. The total revenues over the project life exceed \$318,000,000.

To take into consideration the timing of the receipt of revenues and the occurrence of expenses, the revenues and expenses must be reduced to a common denominator. This reduction or discounting, expresses dollar amount in current (1974) dollars, or present value terms. The exact size of the discount rate that is appropriate depends on many factors, and is the topic of continuing academic debates. For this analysis, three discount rates are given, varying from 6 to 10 percent. For public projects involving long term benefits and requiring substantial initial costs, the 6 percent rate is perhaps most appropriate. At a discount rate of 6 percent, the total benefits over the life of the project are \$78,256,000.

The following Table V-44 presents the analysis of public expenditures needed for the mixture of development land uses proposed. As examined earlier, these costs include direct public service expenses, general administrative costs, and costs to maintain the existing facilities during the construction period. In addition there are special site improvement costs for utilities, price demolition and repair, and resolution of external access problems. The total annual costs are estimated at \$2,617,000 for each stabilized year. Site improvement costs amount to \$5,435,000, while the existing facilities will cost over \$2,300,000 to maintain during the construction period.

Total costs over the life of the project, then, are \$127,640,000. These costs, when discounted at 6 percent, amount to \$36,556,000. Of note here are the substantial costs for non-revenue generating uses and the large "front end" costs for site improvements. These costs reduce the sizable benefits produced by the other land uses in the program.

An alternative approach is to delete the site improvement costs from the analysis because these costs are capital and not operating costs. These costs would be born by the development group or as city capital costs depending on the nature of the development process. When this adjustment is made the public expenditures over the life of the project are as follows:

TOTAL EXPENSE ITEM	122,205,000
Present Value of Costs	
Discounted at 6%	31,633,000
8%	22,810,000
10%	19,151,000

These two approaches give benefit/cost ratios of 2.46 without site improvements and 2.14 with site improvements, discounted at 6%. The benefit/cost ratio is derived by dividing total project revenue by total project expenditures.

#### Employment and Payrolls

In addition to the direct tax revenue benefits occurring to the City of Boston from the development of the Naval Yard, the project will contribute additional indirect benefits to the regional economy. There will be benefits generated by the construction-related employment and payrolls during development phasing, and also benefits from the operational or permanent employment opportunities created. These benefits, in turn, influence and expand the entire regional economy. Further, the expenditures made on the site increase regional income and employment through the multiple effect. Not all benefits can be quantified. Nonetheless, this section identifies and outlines the types and magnitudes of benefits derived from the reuse of the Boston Naval Yard.

The development of the Naval Yard will create employment opportunities both during construction and throughout the operational life of the facilities. The magnitude of the employment and resultant payrolls generated will vary with the specific components of the development alternatives. The following sub-sections of the section outline the absolute and relative units of the various package in terms of construction and operational employment created.

TABLE V-46

CONSTRUCTION RELATED PAYROLL AND EMPLOYMENT GENERATED  
HOUSING/CONVENTION CENTER/HOTEL PACKAGE  
CHARLESTOWN

	1977 - 1986	
	<u>Total</u>	<u>Average Annual</u>
Total Costs for Demolition, Rehabilitation, and New Construction (in thousands) <sup>1/</sup>	\$127,824	\$12,782
Construction Related Payroll (in thousands) <sup>2/</sup>	\$ 57,521	\$ 5,752
Jobs at \$13,000 per Man-Year <sup>3/</sup>	4,425	443

<sup>1/</sup> Includes utility and pier improvement costs of \$5,435,000, broken down as follows: site utilities (\$3,450,000); pier demolition (\$180,000); pier repair (\$1,085,000); and transportation costs external to the site (\$720,000).

<sup>2/</sup> Equal to 45% of construction expenditures.

<sup>3/</sup> Average wage in the construction industry in 1972 was \$11,181, according to the Massachusetts Division of Employment Security; 1974 rate reflects inflation and real wage rate growth.

Source: Economics Research Associates.

Development Costs. Prior to an examination of employment generation, the development costs for housing, hotel, convention center, and institutional development must be estimated. Subsequent estimates of the impact of the project depend on the extent of these expenditures. As shown on the accompanying table (V-45), development costs for the entire mixture of land uses are estimated at \$127,824,000. These costs estimates include demolition, rehabilitation, and new construction within the site itself. Other costs not listed here would also be insured to improve the site in general, increase transportation access, and provide utilities. These additional costs are included in the analysis that follows.

Construction-related Employment. The on-site construction-related employment is estimated based on the total construction expenditures of the project. Based on experience, construction-related payrolls have equalled approximately 45 percent of direct construction costs. This total payroll figure can be converted to an estimation of the number of construction jobs



generated by assuming an average wage per construction worker. The Massachusetts Division of Employment Security has determined the average wage in the construction industry in Massachusetts. After adjusting this figure to reflect both inflation and growth in real income, the resultant average wage, used in the analysis, is \$13,000 per year.

The construction period is taken at 10 years. The number of jobs per non-year can then be computed on a total and average annual basis. This analysis is performed on the following Table V-46, yielding a total of 4,425 jobs created during the entire construction period of the hotel/convention center/housing project. This total converts to 443 jobs per year.

Operational-related Employment. Employment and payroll generated as a result of the operation of the permanent mixture of facilities cannot be determined precisely until the specific tenants and the exact sizing parameters and operating procedures are established. Nonetheless, certain planning standards and utilization data from similar land use facilities are available for estimating operational employment. These standards generally relate employment to space usage. Applying these standards to the separate components of the housing/convention center and hotel development under consideration yields the operational data found on the following table (V-47), as shown, the project creates 1,185 permanent employment opportunities. The total yearly payroll from these jobs is over \$10 million.

The Employment Multiplier. The multiplier is an economic phenomenon created when outside or new dollars are injected into the economy. The multiplier identifies how many times each new dollar is spent and respent within the local economy. The magnitude of the multiplier is contingent upon the economic self-sufficiency of the area. The impact of construction and operational employment on the regional economy can be analyzed in terms of the employment multiplier.

The employment multiplier quantifies the relationship between a one-limit charge in basic employment and the resultant charge in supportive employment in the other sectors of the economy. An analysis of the size of the employment multiplier was done by Eliahu Romanoff

TABLE V-47

OPERATIONAL PAYROLL AND EMPLOYMENT GENERATED  
HOUSING/CONVENTION CENTER/HOTEL PACKAGE  
CHARLESTOWN

<u>Use</u>	<u>Total Yearly Payroll<sup>1/</sup></u>	<u>Number of Jobs Generated<sup>1/</sup></u>
Convention Center	\$ 375,000	50
Hotel	\$ 1,438,000	206
Retail	\$ 2,163,000	309
Marina	\$ 175,000	25
Office	\$ 5,950,000	595
Total	\$10,101,000	1,185

<sup>1/</sup> For standards used for job and payroll generation data, see computations of direct revenues.

Source: Economics Research Associates.

TABLE V-48

ECONOMIC IMPACT OF THE EMPLOYMENT MULTIPLIER  
HOUSING/CONVENTION CENTER/HOTEL PACKAGE  
CHARLESTOWN

	<u>Employment</u>	<u>Payrolls</u>	<u>Regional Spending</u>
<u>Construction Related Impact</u>			
Employment			
Total	4,425		
Annual	443		
Payroll			
Total		\$57,521,000	
Annual		\$ 5,752,000	
<u>Operational Impact (Annual)</u>			
Employment	1,185		
Payroll		\$10,101,000	
<u>Multiplier Effect (at 2.5)</u>			
From Construction Payrolls <sup>1/</sup>			\$11,504,000
From Operational Employment Payrolls <sup>1/</sup>			\$20,202,000

<sup>1/</sup> Assuming take-home pay represents 80% of payrolls.

Source: Economics Research Associates.

of the Regional Science Research Center for the Lowell metropolitan area. The employment multiplier was found to be 2.52. In Romanoff's words, "...for each employee directly engaged in the preparation and execution of construction-related investments, a total of 2.52 employees will be required in the City, where 1.52 employees represent the added indirect labor requirements associated with the program" Other employment multiplier estimates for Mass transit construction and highway construction have resulted in multipliers of basically similar magnitudes. Since multipliers tend to increase in a more urbanized and interdependent economy, the estimate used here of an employment multiplier of 2.5 is regarded as realistic.

Using this figure, the effect of the employment multiplier on the housing, convention center, and hotel program is shown on the accompanying table (V-48). The annual impact from construction payrolls is \$11,504,000, while the impact from operational payrolls is \$20,202,000.

Site Preparation Costs of the Project. The purchaser will incur costs to prepare the Charlestown site for development. These costs include capital costs such as utilities, pier improvements, demolition costs, improving access to the site, and operating costs such as maintaining the existing buildings until redevelopment can take place. These site preparation costs are broken down as follows:

Site utilities	3,450,000
Pier demolition	180,000
Pier repair	1,085,000
Access external to site	720,000
Internal access	379,000
Building demolition	3,863,000
Total	<hr/> \$ 9,677,000

The costs of preparing the site for full scale development should be weighed when considering the attractiveness of the site for reuse.

These costs do not include costs associated with holding the property until reuse occurs. These costs would be substantial and would include management, maintenance, security and insurance costs. It is likely that these costs would be about \$.45 a sq. ft. of floor area per year for comparable space, or \$625,000 per year.

#### Development Concept

Both alternatives proposed for the South Boston Naval Annex involve primarily industrial use. The industrial park program envisions approximately 1.2 million square feet of rehabilitated and new industrial space. The new construction would constitute 30 percent of the total space. Other supporting land uses are described elsewhere in this report.

#### Compatibility of the Use

Since the entire site will be elevated to industrial use, the compatibility of the uses within the site depends on the specific industries and firms locating on the site. A wide variety of industries could be compatible with each other in a well-conceived and executed industrial park. The character of South Boston would not be adversely influenced by a properly designed industrial park. Nonetheless, the selection process for the industrial park should include an evaluation of the industry's compatibility within the community.

#### Marketability and Phasing

The likely market support for industrial space at South Boston depends on market conditions at the time of development. Recent activity in industrial and warehousing markets are given in data in Tables V-49 thru V-51.

The square footage of building permits in the Boston metropolitan area for the past two years has averaged over two million square feet per year, according to the Commercial Construction Markets Survey. The great majority of this space has been added in those communities bordering Route 128 with over 1.6 million square feet of industrial and distribution space per year added in these communities over the last decade.

Another indicator of activity in the industrial market is the amount of unleased space available. The square footage of warehousing, manufacturing, and research and development space is presented in Table V-50, along with the percentage of total space available which was located within the City. The December, 1973 data reveal a reversal of the generally upward trend in warehousing space available, with 947,000 square feet on the market. Over 26 percent of all warehousing space available in the metropolitan area was located within Boston.



INDICATORS OF INDUSTRIAL ACTIVITY,  
BOSTON METROPOLITAN AREA  
OCTOBER, 1972 - OCTOBER, 1973

TABLE V-49

<u>Category</u>	<u>Oct., 1972</u>	<u>Oct., 1973</u>	<u>Change</u>
Square Feet - Permits for Year, as of	1,755,000	2,498,000	743,000
Square Feet Under Construction, as of	1,771,000	2,374,000	603,000
Existing Stock	89,500,000	91,500,000	2,000,000

Note: Area includes Suffolk County; parts of Essex, Middlesex, Norfolk, and Plymouth Counties.

Source: Commercial Construction Markets Survey.

TABLE V-50

SQUARE FEET AND PERCENT OF AVAILABLE INDUSTRIAL SPACE  
IN METROPOLITAN AREA LOCATED WITHIN BOSTON

<u>Survey Date</u>	<u>Warehousing</u>		<u>Manufacturing</u>		<u>Research and Development</u>	
	<u>Percent</u>		<u>Percent</u>		<u>Percent</u>	
	<u>Sq. Ft. Available</u>	<u>of Metro</u>	<u>Sq. Ft. Available</u>	<u>of Metro</u>	<u>Sq. Ft. Available</u>	<u>of Metro</u>
June 1, 1971	697,678	26.0%	1,115,618	30.4%	60,500	4.1%
December 1, 1971	833,485	24.1%	996,375	24.7%	116,000	7.9%
June 1, 1972	789,874	21.3%	821,090	24.7%	125,200	9.2%
December 1, 1972	821,338	19.4%	749,650	29.4%	91,000	8.0%
June 1, 1973	1,096,138	31.3%	737,760	37.8%	76,800	6.9%
December 1, 1973	946,613	26.1%	463,736	25.4%	110,000	11.1%

Source: Ryan, Elliott and Company, Inc.; and  
Economics Research Associates.

SUMMARY OF INDUSTRIAL CONSTRUCTION  
CITY OF BOSTON, 1960 THROUGH 1971

TABLE V-51

<u>Calendar Year</u>	<u>Construction Activity</u>		
	<u>Warehouse/Distribution (s.f.)</u>	<u>Manufacturing (s.f.)</u>	<u>Total Space (s.f.)</u>
1960	0	0	0
1961	40,300	172,900	213,200
1962	300,000	65,816	365,816
1963	0	260,000	260,000
1964	134,200	45,000	179,200
1965	71,808	49,036	120,844
1966	407,400	223,194	630,594
1967	0	0	0
1968	896,110	0	896,110
1969	44,000	103,412	147,412
1970	67,500	0	67,500
1971	0	0	0
Total Construction 1960-1971	1,961,318	919,358	2,880,676
Average Annual Construction: 1960-1971	163,443	76,613	240,056

Source: Ryan, Elliott and Company.

Manufacturing space available in Boston has declined substantially, with the recovery of such industries as electronics largely responsible. As of June 1, 1971, over 1,115,000 square feet of manufacturing space was available within Boston, representing over 30 percent of the total space available in the metropolitan area. The December 1, 1973, Ryan, Elliott report listed 463,736 square feet available, or considerably less than half the level of 30 months previously. Research and development space has continued to be available in modest amounts, with the vast majority of space being offered outside of Boston.

A summary of industrial construction activity in Boston is given in Table V-51. A total of 2,880,000 square feet was constructed in Boston during the 1960-1971 period, representing an average construction level of 240,000 square feet annually. Of this total, however, only 919,000 square feet were manufacturing space, or an average of less than 77,000 square feet per year.

PROJECT PHASING. The attainment of complete occupancy of the industrial space will require a vigorous marketing effort, since the market for industrial space in Boston has not been strong in recent years. Multiple tenants will have to be found, and the entire development package made attractive enough to lure potential users from going to other sites. Economics Research Associates assumes a six year leasing period from the time space is available for occupancy until all available space at Charlestown occupied. This absorption pace, including some marketing prior to the actual availability of space, represents an average annual absorption of between 150,000 to 200,000 square feet per year. This scale of marketing requires the creation of a dynamic industrial marketing effort. It should be noted that, depending on the final development packages assembled, there may be competition for industrial users of space between the Charlestown and South Boston Navy yards sites. This factor should be given careful consideration in planning and developing the two sites.

#### Annual Direct Revenues At Project Completion

The annual direct revenues from the industrial park alternative have been calculated for a stabilized year, when the project is completed. The data on revenue sources and computation techniques presented earlier form the basis

for these revenue estimates. These revenues are presented on the accompanying table, broken down by revenue source for industrial land use. As shown on Table V-52, total direct revenues from the industrial park development package exceed \$1,400,000 annually. Within this alternative as with the others, the importance of the property tax in generating revenue for the City is evident. Over \$1,275,000 in annual revenues come from the property tax.

#### Annual Expenses at Project Completion

The annual direct expenses for the industrial park development also are presented on Table V-52. This data is derived using public service cost data for Boston jurisdictions, as described earlier. The total annual expenses for direct public service costs are approximately \$408,000.

#### Direct Benefits and Costs Over the Life of the Project

To assess the total impact of a development project, the revenues and expenses over the entire useful life of the development must be determined. In this way, the total project impact, from construction to final occupancy, can be measured. In this analysis, the project is assumed to have a useful life of 40 years, with development occurring in the 10 years preceding the beginning of the project life. Development is assumed to begin in 1977, with project completion in 1986 and the useful life running until 2,026.

Table V-52 identifies the direct revenues from industrial park development of the South Boston Naval Annex site. The revenues are prorated during the construction years, according to the percentage of the project completed. The phasing corresponds to that discussed earlier under the marketability and phasing section. Total direct revenues in a stabilized year are \$1,448,000, with revenues beginning in 1979 at \$249,000. The total revenues over the project life exceed \$66,000,000.

To take into consideration the timing of the receipt of revenues and the occurrence of expenses, the revenues and expenses must be reduced to a common denominator. This reduction, or discounting, expresses dollar amount in current (1974) dollars, or present value terms. The exact size of the discount rate that is appropriate depends on many factors and is the topic of continuing academic debate. For this analysis,

**DIRECT REVENUES AND PUBLIC EXPENDITURES FROM INDUSTRIAL PARK ALTERNATIVE  
SOUTH BOSTON  
SITE  
1977-2026  
(Thousands of Dollars)**

TABLE V-52

Use	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	Total: 1987-2026	Total: 1977-2026
Industry	0	0	249	500	749	998	1,248	1,448	1,448	1,448	1,448	57,920	66,008
Present Value Discounted at													
6 percent	0	0	197	374	528	664	783	857	809	763	720	11,477	16,452
8 percent	0	0	183	340	472	582	674	724	671	621	575	7,406	11,673
10 percent	0	0	170	310	423	512	582	614	558	508	461	4,963	8,640
<u>Expense Item</u>													
Direct Public Service Expense for													
Industry	0	0	64	128	192	256	320	371	371	371	371	14,840	16,913
Other	0	0	6	13	19	26	32	37	37	37	37	1,480	1,687
Total	0	0	70	141	211	282	352	408	408	408	408	16,320	18,600
General Administrative Costs <sup>1/</sup>	0	0	38	76	114	152	190	220	220	220	220	8,800	10,030
Site Utilities, Pier Demolition and Repair <sup>2/</sup>	1,787	1,787	1,786	-	-	-	-	-	-	-	-	-	5,360
Maintenance of Existing Facilities <sup>3/</sup>	1,013	1,013	809	664	489	315	140	0	0	0	0	-	4,473
Total Costs	2,800	2,800	2,733	881	814	749	682	628	628	628	628	25,120	38,463
Present Value of Costs Discounted at													
6 percent	2,492	2,351	2,165	658	574	498	428	372	351	331	312	4,978	15,198
8 percent	2,401	2,223	2,009	600	513	437	368	314	291	269	249	3,212	12,637
10 percent	2,314	2,104	1,867	547	459	384	318	266	242	220	200	2,152	10,873

<sup>1/</sup> General administrative cost represents residual, with direct public service costs equaling 65 percent of total costs.

<sup>2/</sup> From estimates by Wallace, Floyd, Ellensweig, Inc.; Boos-Allen, Hamilton; Barton-Aechman.

<sup>3/</sup> City operating expenses incurred to maintain existing facilities; based on a percentage of project completed. These costs do not include holding costs of the development agency.

Source: As noted, and Economics Research Associates.

three discount rates are given, varying from 6 to 10 percent. For public projects involving long term benefits and requiring substantial initial costs, the 6 percent rate is perhaps most appropriate. At a discount rate of 6 percent, the total benefits over the life of the project are \$16,452,000.

The same table presents the analysis of public expenditures needed for the industrial park development. As examined earlier, these costs include direct public service expenses, general administrative costs, and costs to maintain the existing facilities during the construction period. In addition, there are special site improvement costs for utilities, pier demolition and repair, and resolution of external access problems. The total annual costs are estimated at \$628,000 for each stabilized year. Site improvement costs amount to \$5,360,000, while the existing facilities will cost over \$4,470,000 to maintain during the construction period.

Total costs over the life of the project, then, are \$38,463,000. These costs, when discounted



at 6 percent, amount to \$15,198,000. Of note here are the substantial "front end" costs for site improvements. These costs reduce the sizable benefits produced by the industrial sectors.

An alternative approach is to delete the site improvement costs from the analysis because these costs are capital and not operating costs. These costs would be borne by the development group or as city capital costs depending on the nature of the development process. When this adjustment is made the public expenditures over the life of the project are as follows:

TOTAL EXPENSE ITEM	33,103,000
Present Value of Costs	
Discounted at 6%	10,550,000
8%	8,198,000
10%	6,629,000

These two approaches give benefit/cost ratios of 1.52 without site improvements and 1.08 with site improvements, discounted at 6%. The benefit/cost ratio is derived by dividing total project revenue by total project expenditures.

#### Employment and Payrolls

In addition to the direct revenue benefits accruing to the City of Boston from the development of the South Boston site, the project will contribute additional indirect benefits to the regional economy. There will be benefits generated by the construction-related employment and payrolls during development phasing, and also benefits from the operational or permanent employment opportunities created. These benefits, in turn, influence and expand the entire regional economy. Further, the expenditures made on the site increase regional income and employment through the multiplier effect. Not all benefits can be quantified. Nonetheless, this section identifies and outlines the types and magnitudes of benefits derived from the reuse of the South Boston Naval Annex site for industrial park development.

The development of the South Boston site will create employment opportunities both during

DEVELOPMENT COST ESTIMATES FOR  
INDUSTRIAL PARK ALTERNATIVE  
SOUTH BOSTON

TABLE V-53

<u>Site Improvement</u>	<u>Total Demolition and Construction Costs</u>
<u>Access</u>	\$ 723,000
<u>Industrial</u>	
Industry	\$5,957,000
Support Buildings	83,000
Subtotal	<u>\$6,040,000</u>
<u>Total</u>	<u>\$6,763,000</u>

Source: Wallace, Floyd, Ellenzweig, Inc.

TABLE V-54

CONSTRUCTION RELATED PAYROLL AND EMPLOYMENT GENERATED  
INDUSTRIAL PARK PACKAGE  
SOUTH BOSTON

	1977 - 1986	
	<u>Total</u>	<u>Average Annual</u>
Total Costs for Demolition, Rehabilitation, and New Construction (in thousands) <sup>1/</sup>	\$12,123	\$1,212
Construction Related Payroll (in thousands) <sup>2/</sup>	\$ 5,455	\$ 546
Jobs at \$13,000 per Man-Year <sup>3/</sup>	420	42

<sup>1/</sup> Includes utility and pier improvement costs of \$5,360,000, broken down as follows: pier demolition (\$1,120,000); pier repair (\$1,350,000); bulkhead repair (\$1,100,000); site utilities (\$1,790,000).

<sup>2/</sup> Equal to 45% of construction expenditures.

<sup>3/</sup> Average wage in the construction industry in 1972 was \$11,181, according to the Massachusetts Division of Employment Security; 1974 rate reflects inflation and real wage rate growth.

Source: Economics Research Associates.

TABLE V-55

ECONOMIC IMPACT OF THE EMPLOYMENT MULTIPLIER  
INDUSTRIAL PARK PACKAGE  
SOUTH BOSTON

	<u>Employment</u>	<u>Payrolls</u>	<u>Regional Spending</u>
<u>Construction Related Impact</u>			
<u>Employment</u>			
Total	420		
Annual	42		
<u>Payroll</u>			
Total		\$ 5,455,000	
Annual		\$ 546,000	
<u>Operational Impact (Annual)</u>			
Employment	2,089		
Payroll		\$21,935,000	
<u>Multiplier Effect (at 2.5)</u>			
From Construction Payrolls <sup>1/</sup>			\$ 1,092,000
From Operational Payrolls <sup>1/</sup>			\$43,870,000

<sup>1/</sup> Assuming take-home pay represents 80% of payrolls.

Source: Economics Research Associates.

construction and throughout the operational life of the facilities. The magnitude of the employment, and resultant payrolls, will vary with the specific components of the development alternatives. The following sub-sections outline the relative merits of the industrial park development alternative in terms of construction and operation employment created.

Development Costs. Prior to an examination of employment generation, the development costs for an industrial park development must be estimated. Subsequent estimates of the impact of the project depend on the extent of these expenditures. As shown on the accompanying Table V-53, development costs for the entire redevelopment program are estimated at \$6,763,000. These cost estimates include demolition, rehabilitation, and new construction within the site itself. Other costs not listed here would also be incurred to improve the site in general and provide utilities. These additional costs are included in the analysis that follows.

Construction-Related Employment. The on-site construction-related employment is estimated based on the total construction expenditures of the project. Based on experience, construction-related payrolls have equalled approximately 45 percent of direct construction costs. This total payroll figure can be converted to an estimation of the number of construction jobs generated by assuming an average wage per construction worker. The Massachusetts Division of Employment Security has determined the average wage in the construction industry in Massachusetts. After adjusting this figure to reflect both inflation and growth in real income, the resultant average wage, used in this analysis, is \$13,000 per year.

The construction period is taken at 10 years. The number of jobs per non-year can then be computed on a total and average annual basis. This analysis is performed on the following Table V-54, yielding a total of 420 jobs created during the entire construction period of the industrial park project. This total converts to 42 jobs per year.

Operational-Related Employment. Employment and payrolls generated as a result of the operation of the industrial facilities cannot be determined precisely until the specific tenants and the exact sizing parameters and operating procedures

are established. Nonetheless, certain planning standards and stabilization data from similar land use facilities are available for estimating operational employment. These standards generally relate employment to space usage. Applying these standards to the separate components of the industrial development under consideration yields the operation data presented here. The project creates nearly 2,100 permanent employment opportunities. The total yearly payroll from these jobs is nearly \$22 million.

The Employment Multiplier. The multiplier is an economic phenomenon created when outside or new dollars are injected into the economy. The multiplier identifies how many times each new dollar is spent and respent within the local economy. The magnitude of the multiplier is contingent upon the economic self-sufficiency of the area. The impact of construction and operational employment on the regional economy can be analyzed in terms of the employment multiplier.

The employment multiplier quantifies the relationship between a one-unit change in basic employment and the resultant change in supportive employment in the other sectors of the economy. An analysis of the size of the employment multiplier was done by Eliahu Romanoff of the Regional Science Research Center for the Lowell metropolitan area. The employment multiplier was found to be 2.52. In Romanoff's words, "...for each employee directly engaged in the preparation and execution of construction-related investments, a total of 2.52 employees will be required in the City, where 1.52 employees represent the added indirect labor requirements associated with the program." Other employment multiplier estimates for mass transit construction and highway construction have resulted in multipliers of basically similar magnitudes. Since multipliers tend to increase in a more urbanized and interdependent economy, the estimate used here of an employment multiplier of 2.5 is regarded as realistic.

Using this figure, the effect of the employment multiplier on the industrial park program is shown on the accompanying Table V-55. The annual impact from construction payrolls is \$1,092,000, while the impact from operational payrolls is \$43,870,000.



Site Preparation Costs of the Project. The purchaser will incur costs to prepare the South Boston site for development. These costs include capital costs such as utilities, pier improvements, demolition costs, bulkhead repair, and operating costs such as maintaining the existing buildings until redevelopment can take place. These capital costs are broken down as follows:

Site Utilities	\$1,790,000
Pier Demolition	\$1,120,000
Pier Repair	\$1,350,000
Bulkhead Repair	\$1,100,000
Internal Access	\$ 723,000
Building Demolition	\$ 858,000
Total	<u>\$6,941,000</u>

These costs of preparing the site for industrial park development should be weighed when considering the attractiveness of the site for reuse.

The above costs do not include costs associated with holding the property until reuse occurs. These costs would be substantial and would include management, maintenance, security and insurance costs. It is likely that these costs would be about \$.45 a sq. ft. of floor area per year for comparable space, or \$383,000 per year.

SOUTH BOSTON  
PACKAGE B  
CONTAINER PORT/  
INDUSTRIAL PARK

Development Concept

Another proposal for the South Boston Naval annex site involves a mixture of industry and a container port. The container port is treated here as neither a revenue nor an expense item for the City. Any impact the container port might have would require a detailed investigation and analysis beyond the scope of this assignment. The industrial space includes 750,000 square feet of rehabilitated space and 230,000 square feet of new construction. Other uses would be in support of the industrial uses and are examined elsewhere in this report.

Compatibility of the Use

Industrial use would appear to be compatible with container port use as well as other adjacent uses in the immediate South Boston area. Within the industrial land use element itself, the compatibility of the industrial uses depends on their operating procedures and physical placement within the site. While most industrial uses would be mutually compatible, this issue should be addressed as specific industrial uses are identified. Further, the industry seeking space in South Boston should be evaluated in terms of its compatibility within the community.

Marketability and Phasing

The likely market support for industrial space at South Boston depends on market conditions at the time of development, which is still several years in the future.

This project would have less industrial space to be marketed and would therefore, require less time to market. However, the attainment of complete occupancy of the industrial space will still require a vigorous marketing effort. Multiple tenants will likely have to be found and the entire development package made attractive enough to lure potential users from going to other sites. Economic Research Associates has assumed a five year leasing period from the time space is available for occupancy until all available space at South Boston is occupied. This absorption pace, including some marketing prior to the actual availability of space, represents an average annual absorption of between 150,000 to 200,000 square feet per year. This scale of marketing requires the creation of a dynamic industrial environment not presently found in the area. It should be noted

that, depending on the final development package assembled, there may be competition for industrial users of space between South Boston and Charlestown. This factor should be given careful consideration in planning and developing the two sites.

#### Annual Direct Revenues at Project Completion

The annual direct revenues from the mixed industrial alternative have been calculated for a stabilized year, when the project is completed. The data on revenue sources and computation techniques presented earlier form the basis for these revenue estimates. These revenues are presented on the accompanying table, broken down by revenue source for industrial land use. As shown on Table V-56, total direct revenues from the mixed industrial development package exceed \$1,200,000 annually. Within this alternative, as with the others, the importance of the property tax in generating revenue for the City is evident. Over \$1 million in annual revenues comes from the property tax.

#### Annual Expenses at Project Completion

The annual direct expenses for the mixed industrial development are presented on the same table. This data is derived using public services cost data for Boston jurisdiction, as described earlier. The total annual expenses for direct public service costs are approximately \$345,000.

#### Direct Benefits and Costs Over the Life of the Project

To assess the total impact of a development project, the revenues and expenses over the entire useful life of the development must be determined. In this way the total project impact, from construction to final occupancy, can be measured. In this analysis, the project is assumed to have a useful life of 40 years, with development occurring in the 10 years prededing the beginning of the project life. Development is assumed to begin in 1977, with project completion in 1986 and the useful life running until 2026.

This accompanying table identifies the direct revenues from mixed industrial development of the South Boston Naval Annex site. The revenues prorated during the construction year, according to the percentage of the project completed. The phasing corresponds to that discussed earlier under the marketability and

**DIRECT REVENUES AND PUBLIC EXPENDITURES FROM MIXED INDUSTRIAL ALTERNATIVE  
SOUTH BOSTON  
SITE  
1977-2026  
(Dollars in Thousands)**

TABLE V-56

<u>Use</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>1985</u>	<u>1986</u>	<u>1987</u>	<u>Total: 1987-2026</u>	<u>Total: 1977-2026</u>
Industry	0	0	246	492	738	984	1,207	1,207	1,207	1,207	1,207	48,280	55,568
<b>Present Value Discounted at</b>													
6 Percent	0	0	195	368	520	654	757	714	674	636	600	9,567	14,085
8 Percent	0	0	180	335	465	574	652	604	559	518	479	6,173	10,060
10 Percent	0	0	168	305	417	505	563	512	465	423	385	4,137	7,495
<b>Expense Item</b>													
<b>Direct Public Service Expenses for</b>													
Industry	0	0	64	128	192	256	314	314	314	314	314	12,560	14,456
Other	0	0	6	13	19	26	31	31	31	31	31	1,240	1,428
Total	0	0	70	141	211	282	345	345	345	345	345	13,800	15,884
General Administrative Costs <sup>1/</sup>	0	0	43	76	114	152	186	186	186	186	186	7,440	8,569
Site Utilities, Pier Demolition and Repair <sup>2/</sup>	1,280	1,280	1,280	-	-	-	-	-	-	-	-	-	3,840
Maintenance of Existing Facilities <sup>3/</sup>	1,013	1,013	806	600	394	187	0	0	0	0	0	-	4,013
<b>Total Costs</b>	<b>2,293</b>	<b>2,293</b>	<b>2,199</b>	<b>817</b>	<b>719</b>	<b>621</b>	<b>531</b>	<b>531</b>	<b>531</b>	<b>531</b>	<b>531</b>	<b>21,240</b>	<b>32,306</b>
<b>Present Value of Costs Discounted at</b>													
6 Percent	2,041	1,925	1,742	611	507	413	333	314	297	280	264	4,209	12,672
8 Percent	1,966	1,820	1,616	556	453	362	287	266	246	228	211	2,715	10,513
10 Percent	1,895	1,723	1,502	507	406	319	248	223	203	186	169	1,820	9,036

<sup>1/</sup> General administrative costs represent residual, with direct public service costs equalling 65 percent of total costs.

<sup>2/</sup> From estimates by Wallace, Floyd, Ellenswalg, Inc.; Boos, Allen, Hamilton; Barton-Aeschman Associates.

<sup>3/</sup> City operating expenses incurred to maintain existing facilities; based on a percentage of project completed. These costs do not include holding costs of the development agency.

Source: As noted, and Economics Research Associates.

phasing section. Total direct revenues in a stabilized year are \$1,207,000, with revenues beginning in 1979 at \$246,000. The total revenues over the project life exceed \$55,000,000.

To take into consideration the timing of the receipt of revenues and the occurrence of expenses, the revenues and expenses must be reduced to a common denominator. This reduction, or discounting, expenses dollar amount in current (1974) dollars, are present value terms. The exact size of the discount rate that is appropriate depends on many factors, and is the topic of continuing academic debate. For this analysis, three discount rates are given, varying from 6 to 10 percent. For public projects involving long term benefits and requiring substantial initial costs, the 6 percent rate is perhaps most appropriate. At a discount rate of 6 percent, the total benefits over the life of the project are \$14,085,000.

The same table presents the analysis of public expenditures needed for the mixed industrial development. As examined earlier, these costs include direct public service expenses, general administrative costs, and costs to maintain the existing facilities during the construction



period. In addition there are special site improvements costs for utilities, pier demolition and repair, and resolution of external access problems. The total annual costs are estimated at \$531,000 for each stabilized year. Site improvement costs amount to \$3,840,000, while the existing facilities will cost over \$4,000,000 to maintain during the construction period.

Total costs over the life of the project, then, are \$32,306,000. These costs, when discounted at 6 percent, amount to \$12,672,000. Of note here are the substantial "front end" costs for site improvements. These costs reduce the sizable benefits produced by the industrial sector.

An alternative approach is to delete the site improvement costs from the analysis because these costs are capital and not operating costs. These costs would be borne by the development group or as city capital costs depending on the nature of the development process. When this adjustment is made, the public expenditures over the life of the project are as follows:

TOTAL EXPENSE ITEM	\$28,466,000
Present Value of Costs	
Discounted at 6%	9,251,000
8%	7,240,000
10%	5,906,000

These two approaches give benefit/cost ratios of 1.48 without site improvements and 1.11 with site improvements, discounted at 6%. The benefit/cost ratio is derived by dividing total project revenue by total project expenditures.

#### Employment and Payrolls

In addition to the direct revenue benefits occurring to the City of Boston from the development of the South Boston site, the project will contribute additional indirect benefits to the regional economy. There will be benefits generated by the construction-related employment and payrolls during development phasing, and also benefits from the operational

and permanent employment opportunities created. These benefits, in turn, influence and expand the entire regional economy. Further, the expenditure made on the site increase regional income and employment through the multiplier effect. Not all benefits can be quantified. Nonetheless, this section identifies and outlines the types and magnitudes of benefits derived from the reuse of the South Boston Naval Annex site for mixed industrial development.

The development of the Shipyard will create employment opportunities both during construction and throughout the operational life of the facilities. The magnitude of the employment, and resultant payrolls, will vary with the specific components of the development alternatives. The following sub-sections outline the relative merits of the mixed industrial development alternative in terms of construction and operational employment created.

Development Costs. Prior to an examination of employment generation, the development costs for industrial development must be estimated. Subsequent estimates of the impact of the project depend on the extent of these expenditures. As shown on the accompanying Table V-57, development costs for the industrial program are estimated at \$5,402,000. These costs estimate include demolition, rehabilitation, and new construction within the site itself. Other costs not listed here would also be issued to improve the site in general, and provide utilities. These additional costs are included in the analysis that follows.

Construction-related Employment. The on-site construction-related employment is estimated based on the total construction expenditures of the project. Based on experience, construction-related payrolls have equalled approximately 45 percent of direct construction costs. This total payroll figure can be converted to an estimation of the number of construction jobs generated by assuming an average wage per construction worker. The Massachusetts Division of Employment Security has determined the average wage in the construction industry in Massachusetts. After adjusting this figure to reflect both inflation and growth in real income, the resultant average wage, used in this analysis is \$13,000 per year.

DEVELOPMENT COST ESTIMATES FOR  
MIXED INDUSTRIAL ALTERNATIVE  
SOUTH BOSTON

TABLE V-57

<u>Site Improvement</u>	<u>Total Demolition and Construction Costs</u>
<u>Access</u>	\$ 723,000
<u>Industrial</u>	
Industry	\$4,596,000
Support Buildings	83,000
Subtotal	<u>\$4,679,000</u>
<u>Total</u>	\$5,402,000

Source: Wallace, Floyd, Ellenzweig, Inc.

TABLE V-58

CONSTRUCTION RELATED PAYROLL AND EMPLOYMENT GENERATED  
MIXED INDUSTRIAL PACKAGE  
SOUTH BOSTON

	<u>1977 - 1986</u>	
	<u>Total</u>	<u>Average Annual</u>
Total Costs for Demolition, Rehabilitation, and New Construction (in thousands) <sup>1/</sup>	\$9,242	\$924
Construction Related Payroll (in thousands) <sup>2/</sup>	\$4,159	\$416
Jobs at \$13,000 per Man-Year <sup>3/</sup>	320	32

<sup>1/</sup> Includes utility and pier improvement costs of \$3,840,000, broken down as follows: site utilities (\$1,790,000); pier demolition (\$700,000); pier repair (\$1,350,000).

<sup>2/</sup> Equal to 45% of construction expenditures.

<sup>3/</sup> Average wage in the construction industry in 1972 was \$11,181, according to the Massachusetts Division of Employment Security; 1974 rate reflects inflation and real wage rate growth.

Source: Economics Research Associates.

The construction period is taken at 10 years. The number of jobs per non-year can then be computed on a total and average annual basis. This analysis is performed on the following Table V-58, yielding a total of 320 jobs created during the entire construction period of the mixed industrial projects. This total converts to 32 jobs per year.

Operational-related Employment. Employment and payroll generated as a result of the operation of the industrial facilities cannot be determined precisely until the specific tenants and the exact sizing parameters and operating procedures are established. Nonetheless, certain planning standards and utilization data from similar land use facilities are available for estimating operational employment. These standards generally relate employment to space usage. Applying these standards to the separate components of the industrial development under consideration yields the operational data presented here.

The project creates nearly 1,800 permanent employment opportunities. The total yearly payroll from these jobs is over \$18 million.

The Employment Multiplier. The multiplier is an economic phenomenon created when outside or new dollars are injected into the economy. The multiplier identifies how many times each new dollar is spent and respent within this local economy. The magnitude of the multiplier is contingent upon the economic self-sufficiency of the area. The impact of construction and operational employment on the regional economy can be analyzed in terms of the employment multiplier.

The employment multiplier quantifies the relationship between a one-unit change in basic employment and the resultant change in supportive employment in the other sectors of the economy. An analysis of the size of the employment multiplier was done by Eliahu Romanoff of the Regional Science Research Center for the Lowell metropolitan area. The employment multiplier was found to be 2.52. In Romanoff's works, "...for each employee directly engaged in the preparation and execution of construction-related investments, a total of 2.52 employees will be required in the City where 1.52 employees represent the added indirect labor requirements associated with the program." Other employment



multiplier estimates for mass transit construction and highway construction have resulted in multipliers of basically similar magnitudes. Since multipliers tend to increase in a more urbanized and interdependent economy, the estimate used here of an employment multiplier of 2.5 is regarded as realistic.

Using this figure, the effect of the employment multiplier on the mixed industrial program is shown on the accompanying Table V-59. The annual impact from construction payrolls is \$832,000, while the impact from operational payrolls is \$37,086,000.

Site Preparation Costs of the Project. The purchaser will incur costs to prepare the South Boston site for development. These costs include capital costs such as utilities, pier improvements, demolition costs, and operating costs such as maintaining the existing buildings until redevelopment can take place. These site preparation costs are broken down as follows:

Site Utilities	\$ 1,790,000
Pier Demolition	700,000
Pier Repair	1,350,000
Internal Access	723,000
Building Demolition	469,000
	<hr/>
	\$ 5,032,000

These costs of preparing the site for the mixed industrial development should be weighed when considering the attractiveness of acquisition of the site for reuse.

The above costs do not include costs associated with holding the property until reuse occurs. These costs would be substantial and would include management, maintenance, security and insurance costs. It is likely that these costs would be about \$.45 a sq. ft. of floor area per year for comparable space, or \$388,000 per year.

TABLE V-59

ECONOMIC IMPACT OF THE EMPLOYMENT MULTIPLIER  
MIXED INDUSTRIAL PACKAGE  
SOUTH BOSTON

	<u>Employment</u>	<u>Payrolls</u>	<u>Regional Spending</u>
<u>Construction Related Impact</u>			
Employment			
Total	320		
Annual	32		
Payroll			
Total		\$ 4,159,000	
Annual		\$ 416,000	
<u>Operational Impact (Annual)</u>			
Employment	1,766		
Payroll		\$18,543,000	
<u>Multiplier Effect (at 2.5)</u>			
From Construction Payrolls $\frac{1}{2}$			\$ 832,000
From Operational Payrolls $\frac{1}{2}$			\$37,086,000

1/ Assuming take-home pay represents 80% of payrolls.

Source: Economics Research Associates.









APPENDIX A-1  
UNIT COST  
DETERMINATION

The order-of-magnitude cost estimates for each development package which appear in Section III are based on unit prices derived from construction estimator's manuals and the current building experience of WFE. The exceptions are: (1) demolition figures which were supplied by an outside estimator specializing in demolition and excavation; (2) access and parking prices which were supplied by Barton-Aschman Associates; (3) pier demolition and pier repair costs which are from the engineer's report; (4) utility upgrading costs also from the engineer's report; (5) development costs of the container port which are from the supplement to the C.E. Maguire Report (New Container Facilities For Mass Port, February, 1974); and (6) the costs of industrial building rehabilitation for use as industrial space in Package A Charlestown and Packages A and B South Boston Annex which are also from the engineer's report.

Where applicable, the costs include the cost of the building with mechanical systems, foundation, site preparation, landscaping, contingency factors, professional fees, and contractors' overhead and profit at 1974 dollars.

While care has been taken to include all factors contributing to development cost, unforeseen conditions and assumptions to determine the unit costs will greatly influence these figures. It may be possible therefore to use the cost figures in comparing one development package with another of this study for the same site, but extreme care should be exercised when using these figures in any other way. Detailed particulars and assumptions for each unit cost follow.

(1) New Building Construction Costs

- A. Housing. The costs include parking and access costs within the boundary designated for housing use.
- B. Hotel. The costs include interior and exterior public spaces.
- C. Retail Space. The cost assumes a finished shell without tenant improvements.
- D. School/College. The cost assumes an average based on WFE experience.

- E. Marina. The cost represents dock space only. It does not include parking, landscaping, and retail construction.
- F. Museum. The cost represents a finished shell without tenant improvements.
- G. Factory Space. The cost does not include parking and access improvements, and represents a finished shell without tenant improvements.
- H. Parking. (Surface) The cost includes paving, curbs, drainage, striping, and lighting.  
  
(Structure) The cost represents a completed parking structure.
- I. Open Space. The cost includes paving and planting, fences, lighting, and drainage.
- J. Container Port. Figures used for the container port are those used for the preferred layout from the Maguire Report excluding the costs for building demolition, pier removal, site clearance, and access improvement.

## (2) Rehabilitation Construction Costs

- A. Housing. The cost represents a finished, unfurnished dwelling unit ready for occupancy.
- B. Hotel. The cost represents a finished hotel including public spaces.
- C. Retail. The cost represents a finished space ready for leasing, but does not include tenant improvements.
- D. Office. The cost represents a finished space ready for leasing, but does not include tenant improvements.
- E. Parking. The cost includes new access ramps, minor demolition, lighting, striping, and control areas.
- F. Industrial Space. In Package A Charleston and Packages A and B South Boston the figures from the engineer's report include making all necessary repairs to provide a complete, structurally-

sound shell and changes in the shell necessary to comply with applicable codes, but does not include new heating, ventilating, and air conditioning systems, tenant modification, or landscaping. The unit cost used for Package B Charlestown represents all cost items included in the engineer's report figures and also costs for new heating, ventilating, and air conditioning systems for each building because of removal of the power plant in this package.

- G. Warehouse, 199. The cost represents minor repair work and new heating plant (boiler) for the building in Package B.

### (3) Demolition Costs

The costs of building demolition are based on a building-by-building assessment of area, volume, number of floors, type of construction, and location of the building. The costs assume on-site disposal of materials and the existence of normal reinforcing in all concrete work. The costs include slab-on-grade removal but do not include any sub-surface work.

### (4) Access Costs

On-site access costs of Charlestown include resurfacing of the streets designated on each Package Diagram, installation of new sidewalks, curbs, and lighting and new man-holes where required.

The off-site improvement cost for Charlestown is discussed in Section IV, Transportation.

On-site access improvement costs at the South Boston Annex include resurfacing of selected street, rebuilding of the roadway of the street affected by deterioration of the bulk-head, and new street lighting throughout the site.

### (5) Utility Costs

For Package A Charlestown and Packages A and B South Boston the costs to upgrade utilities are from the engineer's report and include the costs of repairing the storm sewer, the sanitary sewer, the water lines, the steam lines, and electrical distribution systems. Utility costs for Packages B and C Charles-



town also assume new sewer and water mains along First Avenue to meet the high-intensity demands of hotels and housing.

(6) Pier Demolition and Repair

Pier demolition and repair costs are from the engineer's report. The costs for pier removal in Package B South Boston are reduced since filling procedures for the container port for that area would allow the demolition work to be done on dry land rather than from a floating barge.

UNIT COSTS

New Construction

- (1) Housing 1,000 SqFt/DU    \$30,000DU Pkg B  
                                     \$45,000DU Pkg C
- (2) Hotel    400 Rm for Pkg. B @ \$25,000/Rm  
                     1,000 Rm for Pkg. C @ \$40,000/Rm
- (3) Retail Space                    \$33/SQ.FT.
- (4) School/College                \$39/SQ.FT.
- (5) Marina    \$10/SQ.FT.        \$250,000 Pkg B  
                                     \$200,000 Pkg C
- (6) Public Open Space            \$1.75/SQ.FT.
- (7) Museum                        \$36/SQ.FT.
- (8) Factory Space                \$14/SQ.FT.
- (9) Parking        Surface    \$700/Space  
                     Structure \$4500/Space

Rehabilitation Estimates

- (1) Housing                        \$23/SQ.FT.
- (2) Hotel                            \$20,000/Room
- (3) Retail                           \$12/SQ.FT.
- (4) Office                           \$12/SQ.FT.
- (5) College/School                \$25/SQ.FT.
- (6) Museum                        \$21/SQ.FT.
- (7) Convention Ctr.                \$28/SQ.FT.
- (8) Parking                        \$ 4/SQ.FT.  
                     (in bldgs. 149 or 199)

- (9) Industrial Space \$7/SQ.FT. Pkg. B  
(10) Warehouse \$0.50/SQ.FT. Pkg. B

Internal Access Improvements

- (1) Resurfacing (Asphalt) \$4.00/SQ.YD.  
(2) Sidewalks \$6.25/LIN.FT.  
(3) Curbstone \$15.65/LIN.FT.  
(4) Manholes \$220 each  
(5) Lighting \$25/LIN.FT.

Utilities

Detailed in engineer's report  
plus new sewer lines: \$1,750,000 Package B  
\$2,250,000 Package C

Pier Demolition and Repair

Detailed in the engineer's report.

External Access Improvements

Alternative costs detailed in Section IV,  
Transportation.  
Preferred layout \$720,000



NEPA

The applicability of the National Environmental Policy Act to both the South Boston and Charlestown packages is based on the ultimate disposition of that Federal land and facilities. Because there is presently a dispute between the Federal and State governments involving portions of these two facilities, it would appear that an environmental impact statement would be needed under NEPA for certain portions of the land, and a Massachusetts Environmental Impact Statement for other portions. The following table shows the general contents of the NEPA environmental impact statement process.

NATIONAL ENVIRONMENTAL POLICY ACT OF 1969

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Goals

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- (a) Utilize a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts in planning and in decisionmaking which may have an impact on man's environment;
- (b) Identify and develop methods and procedures, in consultation with the Council on Environmental Quality established by Title II of this Act, which will insure that presently unquantified environmental amenities and values may be given appropriate consideration in decisionmaking along with economic and technical considerations;
- (c) Include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on -
  - (i) The environmental impact of the proposed action,
  - (ii) any adverse environmental effects which cannot be avoided should the proposal be implemented,
  - (iii) alternatives to the proposed action,
  - (iv) the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and
  - (v) any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented.

Massachusetts EIS Process

Correspondingly, portions of these two facilities which might ultimately fall under state jurisdiction would require a Massachusetts Environmental Impact Statement, provisions for which have been made in the General Laws, Chapter 30, Sections 61 and 62. A review and evaluation of activities is required to determine their impact on the natural



environment and further to use "all practical means and measures to minimize damage to the environment". Basic elements to be included in potential Environmental Impact Statements are: a description of the project, a description of the environment of the area likely to be affected by the proposed project, alternatives to the proposed project, the probable impact of the proposed project and its alternatives on the environment and all measures being utilized to minimize environmental damage. Full Environmental Impact Statements are required for agency projects but because of recent legislative changes, H5828, Chapter 257, 1974, impact statements for private projects are to be addressed to the agency granting the permit and to be geared specifically to the subject matters under that agency's jurisdiction. A determination would be needed therefore at a future time to designate contractor or agency responsibility.

### Clean Air Act

The second major type of applicable legislation is the broad Clean Air Act, its amendments, and its proposed amendments. The most pertinent portions of the Act, as seen on the table below, are the establishment of a broad scope of emission standards. Most particularly involved for both sites are those standards for existing and new stationary sources and those for mobile sources, although all portions of the Act must necessarily be met.

#### CLEAN AIR ACT<sup>1</sup>

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##### Goals

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Grants to and training for air pollution control agencies  
Federal enforcement authority for interstate air pollution  
National regulation of air pollutants from new motor vehicles  
Establishment of national air quality standards  
Provide for state adoption of more stringent standards  
Achievement of air quality standards within 3 years of plan publication  
Development of most desirable land use, transportation, and fuel use policies  
Establishment of standards for existing and new stationary sources  
Provide for public participation and citizen action.

<sup>1</sup> Clean Air Act (42 U.S.C. 1857 et seq.) includes the Clean Air Act of 1963, (P.L. 88-205), and amendments made by the "Motor Vehicle Air Pollution Control Act" - P.L. 89-272 (October 20, 1965), the "Clean Air Act Amendments of 1966" - P.L. 89-675 (October 15, 1966), the "Air Quality Act of 1967" - P.L. 90-148 (November 21, 1967), and the "Clean Air Amendments of 1970" - P.L. 91-604 (December 31, 1970).

# EPA PROPOSALS TO AMEND THE CLEAN AIR ACT OF 1970

The amendments outlined below from EPA Region 1, Environmental News, May 1974, are intended to improve on the intent of the Act and at the same time to account for the present national energy crisis. These essentially represent legislation passed May 1, by the House in the proposed "Energy Supply and Environmental Coordination Act of 1974"

EPA AMENDMENT	PURPOSE
Coal conversion/allocation and temporary EPA suspensions of emission or fuel limits	To authorize temporary variances from emission limits during 1974 and to facilitate long-term coal conversion by power plants consistent with meeting the primary air quality standards.
Review of State Implementation Plans (SIP's)	Identify nationwide state emission limits more stringent than needed to meet health-based "primary" air quality standards and extend deadlines where possible such that nationwide "primary" standards may be achieved.
Extensions for transportation control plans	Grant limited extensions to some urban areas with transportation control plans that cannot be met without serious adverse social or economic effects.
New Source and hazardous emission equipment standards	To simplify monitoring and enforcement of sources normally subject to hazardous or new source performance standards.
Waivers for technology innovations	To encourage development of technology that 1) achieves lower emissions than conventional technology or 2) achieves the standards at substantially less cost than conventional technology.
Assessment of Civil Penalties	To provide penalties in those cases where violations may not be serious enough or costly enough to warrant criminal action.
Stationary source enforcement orders extending past attainment dates	To insure the installation of control equipment without the threat of a plant shutdown if that equipment cannot be fully installed and operating prior to the statutory attainment date.
Applicability of National Environmental Policy Act	To facilitate oil to coal conversions and coal allocation programs needed to meet long-term energy needs.
Automobile emission standards	To "permit auto manufacturers to concentrate greater attention on improving fuel economy while retaining a fixed target for lower emissions" .. President Nixon, Message to Congress on the Energy Crisis, January 23, 1974
OTHER AGENCY PROPOSALS	
AMENDMENT	PROPOSAL
Intermittent Control Systems	Allow indefinite use of intermittent control systems
Significant Deterioration	Remove the authority of the Federal Government to promulgate standards more stringent than those set to protect public health or welfare, allowing States to establish air quality standards cleaner than required by the Federal Government.

There are several amendments to the Act that have been proposed by EPA and other agencies whose potential impact is extensive. As a group, they are aimed at both improving the Act and at accounting for the present energy crisis. Those that appear to have the most impact on these two sites are concerned with coal conversions, temporary suspensions of emissions, extensions of transportation control plans, and new source emission equipment standards. Table A- represents in essence the amendments passed May 1 by the House. The ultimate wording and final disposition of these amendments should be considered at a future date.

#### Review of Indirect Sources

On May 31, 1972, the EPA Administration published initial approvals and disapprovals of state implementation plans submitted pursuant to Section 110 of the Clean Air Act. These were challenged and subsequently all SIPs were disapproved on March 8, 1973, for failure to sufficiently assess and provide for maintenance of standards and for indirect source review. Subsequently, the Administrator promulgated additional regulations requiring states to identify by March 18, 1974, those areas that may exceed any national standards within the next ten years and to develop and submit to the Administrator by June 18, 1975, an analysis of the impact of projected growth on air quality in those areas and to adopt measures needed to assure that growth and development would be compatible with maintenance of the national standards.

The designation of areas requiring institution of maintenance standards is at present being legislated. Proposed regions include the Boston AQCR. The development of specific control strategies will be undertaken over the next six months and should therefore be dealt with at a later time. The general "indirect sources" regulations are given in Table A- .

It is the intent of EPA that indirect source and significant deterioration regulations be consistent with each other. Therefore, because of current proposed rule changes, the significant deterioration question which initially might appear non-applicable because of the already heavy area pollution should

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INDIRECT SOURCES

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Delegation of Review Responsibility to State and Local Agencies  
Effective July 1, 1974  
Applicable sources commencing construction on or after January 1, 1975

(i) In a SMSA:

(a) Any new parking facility, or other indirect source with an associated parking area, which has a parking capacity of 1,000 cars or more; or

(b) Any modified parking facility, or any modification of an associated parking area, which increases parking capacity by 500 cars or more; or

(c) Any new highway section with an anticipated average annual daily traffic volume of 20,000 or more vehicles per day within ten years of construction; or

(d) Any modified highway section which will increase average annual daily traffic volume by 10,000 or more vehicles per day within ten years after modification

be considered for future review.

Boston Transportation Control Plan

The second major category under the Clean Air Act which has an even greater impact on both the South Boston and Charlestown sites is the Boston Transportation Control Plan which is now law, but which is presently being bitterly contested in the courts.

At present, the Plan requirements applicable generally throughout the Boston Intrastate Region include: a 25% reduction of employee parking spaces available, reporting measures to assure a continuing parking space/employee ratio of not more than 75%, and restrictions on on-street parking leading to prohibit on-street parking by commuting employees outside the freeze area.

Controls applicable to the "freeze area", meaning that portion of the Boston Intrastate Region centered within the following boundaries: The B & M right-of-way from Fresh Pond to the Charles River Dam and the Boston Inner Harbor on the north and northeast; the Reserved Channel, Dorchester Street to Old Colony Road, through the Old Harbor around Columbia Point to the Southeast Expressway-Morrissey Boulevard intersection on the east, southeast and south; Freeport Street to Hancock Street, Columbia Road, Massachusetts



Avenue, Southampton Street, Reading Street, Island Street, Chadwick Street, Carlon Street, Albany Street, Hunneman Street, Madison Street, Windsor Street, Cabot Street, Ruggles Street, Parker Street, Ward Street, Huntington Avenue, Brookline-Boston municipal boundary, Montford Street, the Boston University Bridge, Memorial Drive, Fresh Pond Parkway, Alewife Brook Parkway to B & M right-of-way on the south-west and west, and Logan International Airport, essentially include: no off-street parking between 7 and 10 a.m. on weekdays, and restrictions on construction or modification of parking facilities. The South Boston site lies within the "freeze area".

The Commonwealth of Massachusetts "air" legislation applicable herein specifies measures for the Metropolitan Boston area designed to prevent conditions of air pollution and air pollution emergencies. Where emissions cannot be controlled in the general areas listed in the following table, provision is made to restrict or prohibit open burning and storage of domestic, agricultural, and industrial wastes to prevent air pollution conditions.

#### COMMONWEALTH OF MASSACHUSETTS

##### REGULATIONS AS AMENDED FOR THE CONTROL OF AIR POLLUTION IN THE METROPOLITAN BOSTON AIR POLLUTION CONTROL DISTRICT

The purpose of these regulations is to prevent the occurrence of conditions of air pollution where such do not exist and to facilitate the abatement of conditions of air pollution where and when such occur. They are designed to attain, preserve, and conserve the highest possible quality of the ambient air compatible with needs of society.

#### General Regulations to Prevent Air Pollution

1.1 No person owning, leasing, or controlling the operation of any air contamination source shall willfully, negligently, or through failure to provide necessary equipment or to take necessary precautions, permit any emission from said air contamination source or sources of such quantities of air contaminants which will cause, by themselves or in conjunction with other air contaminants, a condition of air pollution.

#### Contents

Nuclear Energy Utilization Facilities	Registration, Record Keeping and Reporting
Fossil Fuel Utilization Facilities	Stack Testing
Fuels	Monitoring Devices and Reports
Visible Emissions	Asbestos Application
Open Burning	Variances
Incinerators	Hearings Relative to Orders and Approvals
Dust and Odor	Enforcement Provisions
Noise	Severability
Transportation Media	.

## City of Boston Air Regulations

The City of Boston Air Pollution Control Commission Regulations for the Control of Atmospheric Pollution, briefly described in the table below, are of course applicable to both areas.

### CITY OF BOSTON AIR POLLUTION CONTROL COMMISSION REGULATIONS FOR THE CONTROL OF ATMOSPHERIC POLLUTION

General Prohibition of Emissions	No person or persons owning, leasing, or controlling the operation of any air contamination source or sources shall willfully, negligently, or through failure to provide necessary equipment or facilities or to take necessary precautions, permit the emission from said air contaminant source or sources of such quantities of air contaminants which will cause a condition of atmospheric pollution.		
Sulfur Content of Fuels Restricted	No person shall cause or permit the use, in the City of Boston, of fuel which contains more than the following percentage of sulfur by weight: a. Bituminous coal - 1.0 percent b. Residual fuel oil - 1.0 percent  The determination of sulfur content shall be by the method of the American Society for Testing and Materials.		
Prohibition of the Construction of Coal- or Residual Fuel Oil-Burning Equipment	No person or persons shall construct, build, install, or in any manner erect, or cause to be constructed, built, installed, or in any manner erected any fuel-burning equipment which utilizes coal or residual fuel oil for fuel, unless permission has been granted therefore in writing by the Commission.		
Existing Fuel Burning Equipment Using Coal or Residual Fuel Oil as Fuel	Rated Capacity of Fuel-Burning Equipment	Maximum Permissible Rate* of Emission of Particulate Matter	Effective Date**
	50,000,000 BTU per hour and less***	0.15 #/MMBTU	July 1, 1973
	More than 50,000,000 but not more than 100,000,000 BTU per hour	0.10 #/MMBTU	July 1, 1974
	More than 100,000,000 BTU per hour	0.05 #/MMBTU	July 1, 1974
	*Pounds of particulate matter per million BTU of potential energy in the fuel burned (#/MMBTU).		
	**Date after which coal or residual fuel oil shall not be burned in the fuel-burning equipment unless a permit has been granted by Commission		
	***Except as provided in Regulation 4.3.1.		
Density of Particulate Emissions from Fuel Burning Equipment Burning Fuels Other than Coal or Residual Fuel Oil	No person shall cause, suffer, allow or permit the emission of smoke, from fuel-burning equipment subject to Regulation 4.4, which has a shade, density, or appearance greater than smoke spot number 2 of the Standard Smoke Scale, as measured in accordance with the standard method of test of the American Society for Testing and Materials, ASTM D2156-65.		
Variances	The Commission with the approval of the Department of Public Health of the Commonwealth may grant such variances to these Regulations as it may, after hearing, deem necessary and proper.		

## AIR QUALITY ASSESSMENT

For the purpose of obtaining a qualitative assessment of the potential impact upon air quality associated with the various land use proposals for the Boston Naval Shipyard, a set of criteria-indices were developed based on land-use-based emissions. Land use emission sources were broadly categorized as follows:

- Residential
- Commercial
- Institutional
- Industrial

Due to a lack of appropriate emission factors that are associated with each of the above land use activities, the relative measure of emission potential will be given by the area of the land use. This area encompasses both projected re-use of existing buildings as well as new construction.

Two other emission categories which are also considered in assessing the total air impact are as follows:

### Automobile

The automotive sources may be further subdivided into on-site and off-site. Techniques for estimating on-site automotive emission associated with intra-site movements, or with idling and transcient mode operation are available. However, necessary data are not available, and in lieu of a quantitative analysis, a combination of the total number of required parking spaces and the projected total volume of peak-hour traffic coming and leaving the project site is used as an index of relative automotive emission potential within the site. For off-site automotive emissions, a cumulative traffic volume, reflecting projected peak-hour vehicle-miles-traveled on major arterials and feeders, is used as a measure of impact due to project-related automotive activity in the immediate surroundings.

### Construction

Construction impacts are primarily the results of fugitive dust from demolition activities, and vehicular emissions associated with disposal of demolition wastes. As a first approximation, some combination of the anticipated area and volume planned for demolition will serve as an index for particulate

COMPARISON OF CRITERIA-INDICES  
BASED ON LAND-USE EMISSIONS

TABLE A-1

	Charlestown			South Boston	
	Alt. A	B	C	A	B
Residential (Population)	-	500	1,040	-	-
Institutional (10 <sup>3</sup> sq ft)	1,170	651	825	-	-
Commercial (10 <sup>3</sup> sq ft)	-	331	630	321	-
Industrial (10 <sup>3</sup> sq ft)	1,100	926	-	1,120	872
Automotive					
Parking (Required)	2090	2960	3310	2100	1810
On-Site	1350	1710	2123	1030	1480
Off-Site	3990	≈5170	≈6425	≈2180	≈3220
Demolition					
Areal (10 <sup>3</sup> sq ft)	590	1,150	1721	726	1010
Volume (10 <sup>3</sup> sq ft)	10,500	32400	64800	8880	9770

Summary

For the Charlestown Alternatives based on equal weighting of the above indices the impact appears:

Residential impact	C>B>A	C-heavy	B-moderate	A- none
Institutional impact	A>C>B	A-heavy	C-moderate	B-moderate
Commercial impact	C>B>A	C-heavy	B-moderate	A-none .
Industrial impact	A>B>C	A-heavy	B-heavy	C-none
Automotive				
Parking impact	C>B>A	C-heavy	B-heavy	A-heavy
In-Site impact	C>B>A	C-heavy	B-heavy	A-moderate
Off-Site impact	C>B>A	C-heavy	B-heavy	A-heavy
Demolition impact	C>B>A	C-heavy	B- moderate	A-low

For the South Boston Alternatives based on equal weighting of the above indices, the impact appears:

Commercial impact	A>B	A-moderate;	B-none
Industrial impact	A>B	A-heavy;	B-moderate
Automotive			
Parking impact	A>B	A-heavy;	B-heavy
In-Site impact	B>A	B-moderate;	A-moderate
Off-Site impact	B>A	B-heavy;	A-heavy
Demolition impact	B>A	B-heavy;	A-heavy



emission potential during the construction phase.

Table A-1 provides a comparison of the alternatives for both Charlestown and South Boston, based on proposed land use and the potential emissions to be derived from individual areas. For example, in Charlestown Alternative A, the residential component is shown as a dash because no area has been set aside in the plans for residential use. In Alternative B, however, 500,000 square feet of area is proposed for housing. This appears on the table as the number 500. Therefore, if emission factors were known for residential areas, then by comparison, Alternative B would have a greater environmental impact than Alternative A.

In the automotive comparison, the parking requirements as well as on-site and off-site travel contributions are considered. The parking requirements from Charlestown Alternative A plans total 2,090 units; Alternative B plans total 2,960 units; and Alternative C plans total 3,310 units. Potential impact then would indicate that Alternative C would be greater than Alternative B and that they would both be greater than Alternative A.

#### Special Problems

The use of a set of criteria indices, based on land-use emissions characteristics provides a qualitative evaluation of the various alternative land-use packages for the two sites on the Boston Naval Shipyard. The relative impacts of these alternatives have been summarized above. There still exist a number of potential air impact problems which are applicable to each of these alternatives, but which are not readily amenable to quantitative evaluation at this time. These problems are generally related to options for off-site or remote heat generation, the implications of indirect source regulations and proposed air quality maintenance programs related to non-degradation requirements. The more significant considerations that still remain to be addressed are as identified below:

Heating requirements for housing and commercial activities and energy requirements for

industrial processes can be obtained by purchasing the additional power from existing utilities. This option, in effect, shifts the added emissions associated with heating and other energy needs to some other area remote from the project site. However, some power generating capacity already exists at the Naval Shipyard, and economic consideration may dictate that some or all of the energy requirements be generated on-site.

With a large fraction of industrial activities, fugitive emission associated with particulate matter and hydrocarbon will be a localized on-site problem. When the specific mix of industry has been identified, an estimate of the potential impact can then be made.

Secondary impact associated with automotive activity generated by the project requires close scrutiny at two levels: (1) within the project site and (2) in the vicinity of the site. Within the project, the analysis should consider the number of available parking spaces, space utilization, model characterization of the average vehicle within the parking area, total number of incoming and outgoing vehicles, typical travel within site and speed characteristics. The impact on automotive activity in the vicinity is reflected not only in the volumes on major arterials and feeders, but even more significantly the potential for traffic congestion in the immediate vicinity of the access routes to the project site. Emission rate of CO and HC from the automobile at low and idle speeds are substantially higher than automobiles traveling at higher speeds.

Another area which warrants further detailed analysis is in the temporal changes in the emission inventories. Growth of the area in the vicinity of the site should be taken into account. This growth projection should reflect existing or proposed transportation control plans for the Boston area, and any non-degradation constraints that may evolve as a result of the air quality maintenance program for this standard metropolitan statistical area which encompasses Boston.

Regulations of Specific Noise Sources

The legislated limitation of noise levels of specific sources is in its infancy and specific numbers may change in time. Existing and proposed recent Federal regulations include:

(1) Federal Highway Administration Regulation, Part 772 (1973).

This regulation sets the "worst hour" noise design goals for new highways. All general land usage, including residences, hotels, schools, hospitals, playgrounds, etc., are limited to  $L_{10} = \text{dB (A)}$  while areas requiring "serenity and quiet" are limited to 60 dB (A). Industrial or other uses not included in the above categories are limited to  $L_{10} = 75 \text{ dB(A)}$ . Additional and more lenient levels based on an indoor noise level of  $L_{10} = 55 \text{ dB (A)}$  are permitted depending on structural and fenestration materials of the buildings involved. The outdoor noise limits are to be applied only to those portions of a land use category having "regular and frequent human usage and where lowered noise level would be of benefit." The approved methods of generating predicted noise values are based on current passenger car and truck noise levels. Enforced future truck noise control is expected to lower highway noise levels.

(2) Federal Aviation Administration Regulation (FAR) Part 36.

This 1969 regulation limits take-off, landing, and side-line noise levels of new aircraft as part of their certification tests. For commercial aircraft weighing about 500,000 pounds and complying with this regulation, the noise level at the center of the Charles-town site during straight take-off on Runway 33L would correspond to 80-85 dB (A). In the future, all aircraft will be required to meet these noise levels through a retrofit program.

(3) Truck Noise Limit Proposed by the Federal EPA under the 1972 Noise Control Act.

Among other noise level characteristics, trucks over 10,000 pounds (GVW) are to have a maximum noise level of 86 dB (A) at 50 feet under full power at 35 mph or less. While this noise limit can currently be met by the

majority of large trucks with original equipment mufflers, air intake silencers, and tires, the small percentage of trucks (roughly 15 percent) using defective or inadequate equipment could be outlawed through this proposed regulation.

(4) Massachusetts Department of Public Health  
Regulation 10- Noise (effective 1 June 1972).

This nuisance regulation is enforced, primarily against industries, by applying the somewhat arbitrary criterion that a facility's operations not cause the broadband noise to be more than 10 dB (A) above the ambient (i.e., with the facility not operating) noise level and that no discernable pure tones be generated. These noise criteria based on relative rather than absolute levels are applied at the property line and outside the nearest inhabited building(s), presumably residential. In case of violations, an engineering analysis describing the noise control measures to be undertaken to meet the criteria is required. Usually specific pieces of equipment such as scrubber fans, punch presses, or assembly machines are the source and must be modified or enclosed.

Noise Regulations for Unspecified Sources

Various criteria and regulations governing the noise level at property boundaries or other specific locations irrespective of the source of noise have been developed over the past twenty years. Their purpose is either to control general community noise originating within certain types of land uses, or to determine the suitability of a site for certain land uses, usually residential. There are also industrial noise exposure regulations designed to minimize workers' hearing loss.

(1) Department of Housing and Urban Development (HUD) Circular 1390.2 (August 1971)

New housing or rehabilitation projects seeking Federal mortgage loans must consider the suitability of a site on the basis of exterior noise as well as noise reaching sleeping quarters whether from external or internal sources (e.g., ventilation, plumbing, etc). Exterior noise exposure limitations are expressed, for example, as 65 dB (A) for eight hours or less per twenty-four hours to



qualify as "Normally Acceptable (discretionary)." The suitability of the location of the project with regard to the NEF contours (applicable only to airports) are also given:

less than NEF-30	- Acceptable
NEF-30 to -40	- Discretionary
over NEF-40	- Unacceptable

The FHWA's interior noise limit of  $L_{10} = 55$  dB (A) during the "worst" hour of traffic flow, which for most larger urban areas implies at least 10 hours of similar traffic noise (i.e., 10 percent of 10 hours), is in effect identical to HUD's criterion for interior noise (from all sources) of 55 dB (A) for one hour out of twenty-four.

(2) Boston Air Pollution Control Commission Regulation (10 February 1972).

In addition to restrictions of noise levels on motor vehicles and other specific mechanically operated devices, these regulations include noise limits at zoning boundaries. Although the regulations have apparently not been enforced, the zoning district boundary line noise levels potentially apply to the proposed Shipyard developments. The maximum daytime levels (irrespective of duration) from non-vehicular sources operating on a public way are listed below. Nighttime levels are set 10 dB (A) lower in each case.

At line of any residentially-zoned lot in a residential or business zone	60 dB(A)
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At line of any business-zoned lot or residential-zoned lot in an industrial zone	65 dB(A)
--	----------

At line of any business- or recreational-zoned lot in an industrial zone	70 dB(A)
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(3) U.S. Department of Labor, OSHA (1971) and EPA "Levels" Proposal (1974).

At present the Occupational Safety and Health Act (OSHA) permits an exposure of 90 dB(A) per eight hour working day and a schedule of higher levels for shorter periods. Although 90 dB (A) is an extremely uncomfortable level to the uninitiated and allows virtually no

speech communication except shouting in one another's ears, many industries have not yet complied with these regulations. Furthermore, reduced exposure levels have already been proposed. OSHA limits may be revised downward from 90 to 85 dB(A) in the near future.

The EPA has suggested an integrated noise level over twenty-four hours of 70 dB(A) in its March 1974 "Levels" document entitled Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. The equivalent eight-hour work day exposure would be a constant 75 dB(A) assuming that the person is exposed to a negligible dose of noise for the remainder of the day. While these noise regulations and proposals are not strictly applicable to land use considerations, it is clear that an effort should be made to separate people from continuous noises above 75 dB(A) and intermittent noises of higher levels. This implies noise control of all stationary and mobile sources within a facility to at least meet the current OSHA regulations for industrial areas.

AMBIENT NOISE  
CHARACTERISTICS OF  
SHIPYARD SITES

Both the Charlestown and South Boston sites of the Shipyard are exposed to considerable existing noise, primarily from transportation facilities. This noise intensity is not likely to either increase or decrease significantly over the next few decades. Traffic and aircraft noise in the Charlestown area are clearly documented and estimates of future levels from these sources are available. In addition to sources "external" to the Shipyard, various "internal" sources associated with the various land use proposals under study must be considered. Cars, buses, and trucks serving the proposed facilities; shipyards and factories; outdoor activities (crowds); and ventilating equipment for hotels, apartments and schools represent such "new" noise sources.

While the noises from any of these essential functions cannot be completely eliminated, various noise control regulations apply to the proposed developments which could in principle be enforced to limit the noise exposure of people living, visiting, and working there to tolerable levels. Furthermore, practical techniques are available to reduce the noise from most common sources. The benefits from such regulatory and physical noise control measures in terms of fewer accidents, less hearing impairment, reduced psychological tension, sounder sleep, etc., must be balanced against the direct and indirect costs of wider buffer zones between noisy and quiet land uses, restricted mobility (e.g. truck exclusions), and reduced efficiency of energy conversion processes resulting from the application of certain noise control measures.

Traffic Noise in Charlestown

A general noise survey of Charlestown and the area around North Station and a prediction of future noise from the primary traffic arteries in this area was performed for the North Terminal Draft Environmental Impact Study (1973). The results of these investigations are:

- (1) Mystic River (Tobin) Bridge traffic noise along currently generates an  $L_{10} = 70$  dB(A)\* contour parallel to and approximately 130 feet

---

\*  $L_{10}$  is commonly used statistical descriptor of non-steady noise, namely the noise level exceeded during ten percent of the measurement period. The notation dB(A) indicates that the noise level in dB has been electronically filtered by an "A" weighting network in the sound level meter.

from the edge of the roadway. The  $L_{10} \approx 65$  dB(A) contour runs parallel to the 70 dB(A) contour at approximately 250 feet from the roadway. This condition extends uniformly from the northern end of the National Park Service area northward. These noise levels persist from 7 o'clock a.m. to approximately 10 o'clock p.m. each weekday. The proposed modifications of various North Terminal traffic schemes had little effect on the contours in this area including 1990 traffic volumes.

(2) Along the western boundary of the Shipyard (Chelsea Street), the combined noise levels from local traffic and Mystic River Bridge traffic lie about 5 dB(A) higher than the highway-only contours described above. This is roughly equivalent to doubling distances of the above contours from the edge of the Mystic River Bridge. Insufficient data on existing local traffic volumes and mix limit our ability to project the traffic noise from this source in the various proposed development schemes for the Charlestown site with reasonable accuracy. A great dependence on truck traffic volumes is evident in all urban traffic noise analyses.

(3) Noise levels in the Shipyard well away from these busy traffic arteries (over 300 feet) can be estimated from data obtained in Charlestown during the period when the Mystic River Bridge was being repaired in 1973.  $L_{10}$  is expected to lie between 58 and 63 dB(A), assuming that there are no nearby trucks or loud Yard activities. The noises under these conditions typically arise from local and distant highway traffic, occasional aircraft, and children at play.

(4) Nighttime (10 o'clock p.m. through 6 o'clock a.m.)  $L_{10}$  noise levels lie 8 to 10 dB(A) lower than the average daytime levels. The reduced traffic volumes during this period generate a more erratic noise pattern that may be more disturbing to those people living relatively close to the major traffic arteries than the higher but steadier daytime noises. Since criteria for sleep or quiet activities generally dictate an average noise level at least 10 dB lower than during periods of higher activity, one can conclude that traffic noise represents an equal nuisance day and night, despite the lower nighttime values.



## Aircraft Noise in Charlestown

The center of the Charlestown site is slightly under two miles from the end of runway 33L at Logan International Airport, but less than 1/2 mile from a commonly-used flight path for take-offs from that runway with East Coast destinations. Individual commercial jet aircraft produce peak noise levels of 80 to 85 dB(A) in the Shipyard area. Typically, these levels persist for 10 to 20 seconds per flight emerging from the receding into the general background noise over a period of 30 to 50 seconds.

The Shipyard area lies wholly on the "quiet side" of the 1980 NEF-30 contour provided by the Federal Aviation Administration in 1974. Also, according to the FAA, the past and current efforts to reduce aircraft engine noise have been sufficiently fruitful to allow rather optimistic predictions of commercial aircraft noise by the 1980's. According to a recent study, the result of quieter engines is that the future NEF-30 contours will lie within the property boundaries of large airports.

## Existing Noise in South Boston Site

The primary "external" noise feature at the South Boston site is aircraft flyover noise from heavily utilized runway 22. The site lies wholly within the NEF-30 contour and its eastern tip lies within the NEF-40 contour. The maximum noise levels due to commercial aircraft will lie in the range of 90 to 95 dB(A) in the NEF-30 to -40 region and may reach 100 dB(A) within the NEF-40 contour area of the site. Other noise sources include local traffic, other Logan Airport operations, intermittent shipping and railroad activities, and nearby industrial facilities. When no loud activities on the site occur the background due to external noise sources, excluding aircraft, can be expected to be similar to the Charlestown site, i.e. 58 to 63 dB(A). Existing noise conditions alone should discourage the use of this site for non-industrial purposes, including those that involve human outdoor activities.

While precise noise levels cannot be predicted, documented evidence can be utilized to give the ranges of typical sources that are likely

to be associated with anticipated land uses. Typical values can be used to determine the siting of facilities within the developments and to select structural and building components that will avoid serious problems with noise. As a general rule, the noise level from a source decreases at 6 dB per doubling of distance, for concentrated individual sources such as a cooling tower, a particularly loud vehicle, or the exhaust of an industrial engine. The noise level decreases at nearly half the rate, i.e. 3 dB per doubling, if the source is extended, such as a line of automobile traffic, a long row of open factory windows, or a large, noisy crowd. In addition, noise levels can be decreased to varying degrees by barriers, including buildigns, earth berms, extensive dense plantings, etc.



Continuous Contact

Economic and Industrial Development Commission  
Boston Redevelopment Authority  
United States Navy

Interviews\*

Base Conversion Commission  
Boston Department of Traffic and Parking  
Boston School Committee  
Boston Shipbuilding Corporation  
Executive Office of Environmental Affairs  
(Massachusetts)  
Federal Aviation Administration  
Government Services Administration  
Jung-Brennan Associates  
Massachusetts Bay Transportation Authority  
Massachusetts Department of Public Works  
Massachusetts Historical Commission  
Massachusetts Port Authority  
Metropolitan Area Planning Council  
Metropolitan District Commission  
National Park Service  
United States Coast Guard

Telephone Conversations

Boston Harbor Associates  
Boston Landmark Commission  
Department of Traffic and Parking (Boston)  
Massachusetts Department of Natural Resources  
Environmental Protection Agency  
Charlestown Fire Chief

\* Minutes and memos on the contents of the interviews are available.





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APPENDIX A-6  
STAFF INVOLVEMENT

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APPENDIX B-1  
FISCAL OVERVIEW  
OF THE CITY OF  
BOSTON

Massachusetts and the City of Boston raise revenue through tax sources and non-tax sources. Non-tax sources include federal grants and reimbursements, unclaimed deposits, fines and penalties, miscellaneous interest or rents, payments for services such as patients' payment of bills to state hospitals or customers' payment of bills to state utilities, the state lottery, and various payments in lieu of taxes made by universities, housing projects and other tax exempt institutions. Taxable sources include property taxes, personal income taxes, consumer and transaction taxes, business excise taxes, and miscellaneous taxes.

The State grants taxation powers to the cities and towns. Currently, cities and towns in Massachusetts may levy and collect only two kinds of taxes: (1) the general tax on real and personal property; and (2) the motor vehicle excise tax, which is levied by the State and collected by the State. Although the majority of the tax and non-tax revenues are collected by Massachusetts, the State returns portions of this revenue to the cities -- usually for specific uses such as education. Annual "Cherry Sheets" are sent to the cities showing how much money is owed to the State against the amount of money which is forthcoming as state aid.

Thus, it is extremely complex to determine the amount of revenue which will be gained by the City of Boston from any given type of new development. Residential uses, for instance, would produce revenue directly to the City in the form of property taxes and motor vehicle taxes. Commercial property, on the other hand, would produce property tax revenue to the city and cigarette sales, alcohol and other excise tax revenue to the state and would be partially returned to Boston as some sort of state aid.

The taxes which bring in the greatest volume of revenue are: Property Tax, Personal Income Tax, Motor Vehicle Tax, Corporation Excise Taxes, Sales and Use Tax, and the Motor Fuels (Gasoline) Tax.

Sources and Uses of Funds

The City of Boston both receives and draws funds from a wide variety of sources. An analysis of the appropriations and revenues from Boston are shown on the accompanying Table B-1. As shown the City budget accounts for approximately

ANALYSIS OF APPROPRIATIONS AND REVENUES  
BOSTON, MASSACHUSETTS  
1971 and 1972

TABLE B-1

Appropriation	1971		1972	
	Number <sup>1/</sup>	Percent	Number <sup>1/</sup>	Percent
City Budget	\$188,326	45.0%	\$227,822	45.7%
County Budget	16,287	3.9	19,676	3.9
School Budget	95,701	22.9	105,813	21.2
Debt and Interest	34,867	8.3	37,891	7.6
Assessments <sup>2/</sup>	29,818	7.1	34,611	6.9
Pensions and Annuities <sup>3/</sup>	27,374	6.6	29,172	5.9
Overlay <sup>4/</sup>	20,026	4.8	19,178	3.8
Deficits <sup>5/</sup>	5,691	1.4	24,960	5.0
Total	\$418,090	100.0%	\$499,123	100.0%
<u>Revenues and Credits</u>				
Departmental:				
City	\$ 55,097	13.2%	\$ 60,542	12.1%
County	5,005	1.2	5,325	1.1
Schools	1,177	0.3	1,347	0.3
From State:				
City	8,855	2.1	\$ 12,061	2.4
County	350	0.1	425	0.1
Corporation Tax	789	0.2	789	0.2
Other	41,272	9.9	71,977	14.4
Motor Vehicle Excise Tax	9,787	2.3	9,179	1.8
Free Cash	2,000	0.5	-	-
To Be Raised by Taxation	293,758	70.2	337,478	67.6
Total	\$418,090	100.0%	\$499,123	100.0%

<sup>1/</sup> Numbers in thousands.

<sup>2/</sup> MDC assessments - park, MBTA assessments, and state assessments.

<sup>3/</sup> Contributory and non-contributory.

<sup>4/</sup> Current and deficit.

<sup>5/</sup> Sewer, water, and estimated receipts deficit.

Source: City of Boston Finance Commission, Annual Report to the Legislature:  
and Economics Research Associates.

45 percent of the appropriations, amounting to some 228 million dollars in 1972. The only other use of funds is the school budget, which accounts for approximately 106 million dollars. A more detailed breakdown of the City budget appropriations is given in the next table (B-2). The two largest items on the 1972 budget are the police department (21.3 percent), and the health and hospitals department (26.2 percent). Other purposes accounting for 5 percent or more of the City budget are general government, the fire department, the public works department, and miscellaneous items. Miscellaneous items include workmen's compensation, snow removal, hospitalization and insurance, and numerous other categories.

The City derives revenues from many sources at both the City and State levels. The exact nature of these revenue sources will be discussed later in subsequent sections. Over one third of a billion dollars, representing two thirds of the total revenues and credits, comes from city taxation.

#### Role of the Property Tax

Boston's fiscal system is dominated by the property tax. The Massachusetts constitution prohibits cities and towns from levying any tax other than the property tax. As shown on data presented on the following Table B-3, Boston funds 65 to 70 percent of its expenditures through the property tax. Boston's reliance on the property tax is currently higher than that of any major city in the country. This disproportionate dependence on the property tax compared with other cities is shown in the next Table B-4, which gives the effective property tax ratio in the nation's largest cities.

One reason why the Boston rate is higher is that Boston cannot draw revenue from other sources. Most other cities are able to utilize other sources of taxation, such as the sales tax. Assessment policies which value properties of less than 100 percent fair market valuation --the ratio that is theoretically applied-- also inflate the tax rate, which is \$196.70 per \$1,000 of assessed valuation.

The high cost of owning real estate in Boston has direct implications on potential uses for the Boston Naval Ship Yard property. Manufacturing firms which are space extensive find land and building costs prohibitively high. Further, new



TABLE B-2

DETAILS OF GENERAL APPROPRIATIONS, CITY OF BOSTON BUDGET  
1971 and 1972

Purpose	1971		1972	
	Number <sup>1/</sup>	Percent	Number <sup>1/</sup>	Percent
General Government	\$ 17,645	9.4%	\$ 24,209	10.6%
Police Department	40,627	21.5	48,481	21.3
Fire Department	25,178	13.4	31,618	13.9
Building Department	2,378	1.3	2,712	1.2
Civil Defense Activities	100	0.1	115	0.1
Traffic and Parking Department	1,506	0.8	1,947	0.8
Licensing Board	163	0.1	166	0.1
Public Works Department	18,083	9.6	20,507	9.0
Health and Hospitals Department	52,290	27.7	59,598	26.2
Veteran's Services Department	7,678	4.1	9,235	4.0
Library Department	6,134	3.2	7,121	3.1
Parks and Recreation Department	7,474	4.0	7,702	3.4
Miscellaneous	9,070	4.8	14,411	6.3
Total	\$188,326	100.0%	\$227,822	100.0%

<sup>1/</sup> Numbers in thousands.

Source: City of Boston Finance Commission, Annual Report to the Legislature for 1972.

TABLE B-3

BOSTON'S MUNICIPAL REVENUE YIELD BY SOURCE AND YEAR  
(General Revenues Only)

Year	Thousands of Dollars			Percent Composition		
	Total Revenues	Property Tax	Other Sources	Total Revenues	Property Tax	Other Sources
1960	194,981	147,578	47,403	100.0	75.7	24.3
1961	200,067	147,671	52,396	100.0	73.8	26.2
1962	208,286	145,297	62,989	100.0	69.8	30.2
1963	198,340	145,298	53,042	100.0	73.3	26.7
1964	201,708	138,720	62,988	100.0	68.8	31.2
1965	237,836	171,350	66,486	100.0	72.0	28.0
1966	254,223	152,257	101,966	100.0	59.9	40.1
1967	291,809	180,352	111,457	100.0	61.8	38.2
1968	317,013	203,102	113,911	100.0	64.1	35.9
1969	326,240	230,896	95,344	100.0	70.8	29.2
1970	364,765	253,546	111,219	100.0	69.5	30.5
1971	418,090	293,758	124,332	100.0	70.3	29.7
1972	499,123	337,478	161,645	100.0	67.6	32.4

Source: Assessing Department Annual Reports - 1960-1970 Preliminary Assessing Department Broad Sheets, 1971-1972; Data compiled by Boston Redevelopment Authority and found in Boston's Tax Strategy; The Fiscal Experience of the City, May, 1974.

**EFFECTIVE PROPERTY TAX RATES IN THE  
NATION'S 30 LARGEST CITIES  
1972/1973**

**TABLE B-4**

	<u>Effective Rate Per \$1,000 of Market Value</u>
Boston	\$52.20
Buffalo	50.99
Milwaukee	45.37
Indianapolis	38.07
Baltimore	35.57
Los Angeles	33.77
Pittsburgh	30.84
San Diego	29.09
Phoenix	28.78
San Francisco	28.39
Chicago	28.10
New York	26.72
Philadelphia	26.09
Denver	24.47
Memphis	23.09
Cincinnati	21.85
Cleveland	21.84
Detroit	21.43
Kansas City	21.14
Nashville	19.98
San Antonio	19.53
St. Louis	19.39
Jacksonville	18.40
Washington	17.70
Columbus, Ohio	17.30
Seattle	16.01
Atlanta	13.93
Dallas	10.95
New Orleans	10.92
Houston	10.02
Unweighted Average	25.40

Source: Department of Finance and Revenue, Washington, D. C.  
Major State and Local Tax Burdens in Washington Com-  
pared with Those in the 30 Largest Cities.

firms with high plant and equipment costs find entry difficult. Such a situation favors the construction of small office or commercial units. Similarly, the property tax situation makes new higher income apartments which are larger and charge more per square foot more productive revenue sources to the City.

#### The Role of Exempt Property

A contributing factor to the high tax burdens of property owners is the amount of tax-exempt property in Boston. The Boston Redevelopment Authority, in a paper entitled Boston's Tax Strategy: The Fiscal Experience of the City, has recently reviewed the problems created by tax-exempt property in Boston. Almost half of Boston's total land area was exempt property in 1970. This relationship, when illustrated graphically, shows quite clearly that the amount of tax-exempt property in Boston is growing, while taxable property has widened on historical decline.

The majority of the tax-exempt property is contained in wards which are relatively wealthy and therefore potentially able to provide greater revenue from their taxable land than other areas. At present, 48 percent of the City's property is carrying the tax burden of providing the City with 65 to 70 percent of its operating funds.

Certainly, tax-exempt property does provide benefits to Boston residents. However, jobs and public benefits from exempt institutions such as universities and hospitals serve a regional audience rather than the local public. In addition, Boston still must provide municipal services to exempt institutions.

#### Capital Investment Trends in the City of Boston

The fiscal situation hinges on the creation of a sound social and economic environment. The City of Boston has underway a public facilities and capital improvements program designed to enhance the process of neighborhood revitalization, and to complement major investment commitments to the downtown area. During the 1975-1985 period, the City plans a 1.3 billion dollar program to induce, encourage, and support investment designed to produce growth in jobs, income, and opportunities for Boston residents.

The capital investment in the City of Boston, both historical and projected, is shown on the

the next Table B-5. As shown the rate of public and private investment is projected to increase dramatically. The Boston Naval Ship Yard presents an opportunity for the City to continue its commitment to the City's neighborhoods, while stimulating enormous amounts of private investment into a variety of land uses.

#### Fiscal Status of the City

The potential for the successful development of a large project in any area depends greatly on the overall health of the city. The Boston Redevelopment Authority has determined that although the economy is strong, the city has not benefited from its own economic growth. While the City's problems are fiscal in nature, they can be overcome and the capital program of 1.3 billion dollars by 1985 is feasible, according to a recent BRA study.

One indication of the fiscal strength of Boston is the rating of its bonds. In 1973 Boston City Bonds received an upgraded rating for the first time in 14 years. A well conceived and implemented development program for the Boston Naval Ship Yard will add further strength to the City's fiscal position. The extent of the benefits and costs to the City created by alternative land use packages for the two Ship Yard sites is analyzed in the following report subsections.



TABLE B-5

CAPITAL INVESTMENT, PUBLIC AND PRIVATE, IN THE  
CITY OF BOSTON  
1960-72, ACTUAL; AND 1975 AND 1980, TARGETS  
(Millions of Dollars at 1970 Prices)

<u>Year</u>	<u>Total</u>	<u>Private</u>	<u>City of Boston</u>	<u>State, Federal Government and Semi-Autonomous Agencies</u>
1960	\$585 *	\$472 *	\$13	\$100 *
1961	607	487	10	110
1962	678	550	17	111
1963	633	497	23	113
1964	719	575	21	123
1965	752	600	20	132
1966	821	661	27	133
1967	850	665	31	153
1968	856	678	38	140
1969	873	683	36	154 *
1970	891 *	689 *	58	144 *
1971	940 *	715 *	73	152 *
1972	\$1,000 *	\$750 *	\$82	\$168 *

Average Annual Rate of Investment

1960-67	\$706	\$563	\$20	\$122
1968-71	890	691	51	148
1972	1,000	750	82	168

Projected

1975	\$1,262	\$975	\$112	\$175
1980	1,635	1,270	145	210

\* Estimated.

Source: Boston Redevelopment Authority.

APPENDIX B-2  
REVENUE SOURCES

The direct tax revenues generated by the reuse of the Boston Naval Shipyard come from five general sources: property taxes, personal income taxes, consumer and transaction taxes, business excise taxes, and miscellaneous taxes. The real estate property tax and certain of the personal property taxes are the only ones levied and collected directly by the cities. Although the remaining taxes are collected by the State, a portion of the revenues are returned to the cities. This section examines the nature and method of measurement of these taxes, and then identifies the specific taxes which are applicable to the various land uses proposed for the Boston Naval Shipyard.

Property Taxes. The property tax is a residual tax levied by the cities to raise revenue for expenses unmet by other revenue sources. The current tax rate is \$196.70 per \$1,000 of assessed valuation. De facto assessment ratios vary according to the location and type of property, although theoretically, assessment on all types of property should be in the same ratio.

Personal Income Taxes. A second revenue source is from the personal income tax. This State tax covers wages and salaries, interest and dividends, annuities, etc. The personal income tax on wages and salaries is 5 percent. Of the total revenues collected by the Commonwealth from this tax, approximately 11 percent is returned to Boston, according to a study of Park Plaza done by the Boston Redevelopment Authority. Revenues will accrue to the City from residents of the Shipyard sites and also from employees who work at the site. The procedure for estimating the revenues to be derived from the personal income tax will be explored under the applicable land uses.

Consumer and Transaction Taxes. There is a State tax on the sale, storage, use, or other consumption of tangible personal property in Massachusetts. The sole tax rate is 3 percent of the purchase or rental price. Approximately 15 percent of the sales tax is returned to Boston, according to a Boston Redevelopment Authority report. Additionally, there is a State tax on meals of \$1.00 or more, as well as on any amount of alcoholic beverages bought and consumed on the premises. The tax rate is 5 percent, with 11 percent being returned to Boston.

All alcoholic beverages sold are taxed, with

the rate varying according to the type of beverage and its alcoholic content. Cider, for example, is taxed at \$0.0228 per gallon, while beverages containing over 50 percent alcohol are taxed at \$3,363 per gallon. Also, there is a State excise tax on each cigarette sold in Massachusetts. The rate is 8 mills per cigarette, or 16 cents per package of 20. Approximately 11 percent of the alcohol revenues are returned to Boston, while 0.4 percent of the cigarette excise tax revenues are returned to Boston.

Corporation Excise Tax. The corporation excise tax is a State tax on the net income and/or tangible property of business earning income in Massachusetts. The rates vary with the type of income, with a minimum payment of \$114. Manufacturing operations are exempt from the tangible property tax on inventory, machinery, and equipment. Since the rate varies by type of business and depends on net income, both of which are unknowns in a general case, the amount of the tax revenues generated can only be estimated very generally.

For purposes of this analysis, the BRA estimation procedure has been adopted. It is assumed that net income represent approximately 8 percent of total revenues, and that the effective State business tax rate averages 8 percent. An estimated 11 percent of this revenue will be returned to Boston.

Miscellaneous Taxes. There are numerous other taxes which exist at the State level and could be applied. These include inheritance taxes, licenses and fees, racing taxes, raffle and bazaar taxes, and others. In this analysis, the only other taxes estimated are room occupancy taxes and motor vehicle excise taxes (actually a property tax). The room occupancy tax is a State tax on the rental piece of a tourist accommodation. Exemptions are made if the accommodation is rented for over 90 days or if the rental rate is 2 dollars per day or less. The tax rate is 5.7 percent, with approximately 11 percent returned to Boston.

Finally, there is a tax levied on vehicles according to their age and assessed value. The rate is set uniform throughout Massachusetts, but is collected by the individual towns. The rate is \$66 per \$1,000 of assessed valuation,

with the assessment ratio declining as the car ages.

## RESIDENTIAL LAND USE

For multi-family residential development such as that proposed in two alternatives for the Charlestown site, there are three revenue sources accruing to the City from the annual operation of the units. These revenue sources are the real property tax, the personal income tax, and the motor vehicle excise tax. The following sub-sections outline the techniques to be used in estimating the magnitude of the revenues generated by each source.

Real Property Tax. On revenue producing projects such as apartments, the property tax is based on the gross income of the project. Once the rental rates have been set, expenses and deductions are subtracted to determine the net income stream of the property. Then, the net income is capitalized to provide an estimate of value. Typically, the real property tax will be 6.0 to 6.5 percent of market value. Alternatively, the property taxes of sales units can be determined by multiplying the current tax rate by 26 percent of market value. Regardless of the estimation procedure, the same approximation of revenue to the City should result.

Personal Income Tax. The Commonwealth of Massachusetts levies a tax on personal income, including wages and salaries, interest and dividends, annuities, business income, etc. The rate is 5 percent of net income per unit or 20 percent of gross rent, assuming that 25 percent of net income is spent for shelter. A study of public costs and tax revenue benefits conducted by the Boston Redevelopment Authority concluded that the City receives approximately 11 percent of the revenue from the personal income tax as State aid.

Motor Vehicle Excise Tax. The motor vehicle tax is levied against vehicles according to their age and assessed value. The rate is uniform throughout the State, but is collected by the individual towns. The rate is \$66 per \$1,000 assessed valuation, with the assessment ratio dependent upon the age of the vehicle. The estimated tax potential per car for a two year old car initially bought for \$3,500 dollars is \$138.



## INDUSTRIAL LAND USE

Another potential use for the Shipyard is for industrial purposes. Assuming industrial users occupy manufacturing space, the three major revenue sources are the property tax, the personal income tax, and the corporation excise tax. A method for estimating the revenues from these sources is given below.

Property Tax. The range of actual assessment ratios found in a survey by Economics Research Associates was substantial, reflecting in part the time lag between assessments. The average assessment ratio was found to be 47 percent. The actual tax revenue is computed by determining the market value of the building, applying the assessment ratio, and then multiplying the tax rate of \$196.70 per \$1,000 of assessed valuation.

Corporation Excise Tax. Manufacturing corporations are exempt from paying a tax on tangible personal property. They do pay a State tax on net income, however. Determination of the exact magnitude of the tax revenue is difficult, since income will vary according to the type of industry. The corporation excise tax is estimated at 8 percent of gross income, or 8.55 percent of net income. An estimated 11 percent of the State revenue is returned to Boston, according to the Boston Redevelopment Authority estimate.

Personal Income Tax. The revenues generated from industrial employees at the Shipyard are estimated by assuming the typical industry utilizes 500 square feet per employee. Average wages are estimated at \$10,500 per year. These wages are taxed at 5 percent, with 11 percent returned to Boston.

## RETAIL LAND USE

Retail space for specialty shopping generates revenues from a variety of sources. These sources are the property tax; personal income tax; sales tax, meals tax, alcohol tax, and cigarette tax; and business taxes. While not all the tax revenues from these sources can be determined and allocated for a single project, the following sections provide techniques for estimating certain tax categories.

Property Tax. As with previous land uses, the revenues generated can be estimated at 6.0 to 6.5 percent of market value. Alternatively,

TABLE B-6

REVENUES GENERATED THROUGH RESIDENTIAL DEVELOPMENT  
IN THE CITY OF BOSTON

<u>Revenue Source</u>	<u>Basis of Measurement</u>	<u>Percent Allocated to Boston</u>
Property Tax		
Rentals	6.0-6.5% of market value of building	100%
Sales	26% of market value x tax rate	100%
Personal Income Tax	20% of gross rent	11%
Motor Vehicles Excise Tax	\$66/\$1,000 of assessed value	100%

Source: Economics Research Associates.

TABLE B-7

REVENUES GENERATED THROUGH INDUSTRIAL DEVELOPMENT  
IN THE CITY OF BOSTON

<u>Revenue Source</u>	<u>Basis of Measurement</u>	<u>Percent Allocated to Boston</u>
Property Tax	47% of market value x tax rate	100%
Corporation Excise Tax	8% of gross income, or 8.55% of net income	11%
Personal Income Tax	5% of wages	11%

Source: Economics Research Associates.

TABLE B-8

REVENUES GENERATED THROUGH RETAIL DEVELOPMENT  
IN THE CITY OF BOSTON

<u>Revenue Source</u>	<u>Basis of Measurement</u>	<u>Percent Allocated to Boston</u>
Property Tax	6.0-6.5% of market value	100%
Business Tax	8% of gross income, or 8.55% of net income	11%
Sales Tax	Retail sales x 3%	15%
Meals Tax	5% of price	11%
Alcohol Tax	.57% of gross receipts, and approximately \$1.25 per gallon	11%
Cigarette Tax	16 cents per pack	.4%
Personal Income Tax	5% of wages	11%

Source: Economics Research Associates.

the tax also approximates one third of the market value multiplied by the current tax rate.

Business Excise Tax. The State taxes corporation income according to the type of business. The revenues generated are estimated at 8 percent of gross income or 8.55 percent of net income. The BRA estimates 11 percent returns to Boston.

Sales Tax. There is a State tax on retail sales. The rate is currently 3 percent of the purchase price of an item. According to the Boston Redevelopment Authority, approximately 15 percent of the tax is returned to Boston in the form of State aid.

Meals Tax. There is a State tax on meals of \$1.000 or more. The current rate is 5 percent of the price. An estimated 11 percent returns to Boston.

Alcohol and Cigarette Tax. There are also alcohol and cigarette taxes, a portion of which are returned to Boston. The alcohol tax rate vary with the type of alcohol on a per gallon basis, and is not estimated here. Similarly, the cigarette tax is on a use basis, with the rate being 16 cents for a package. Approximately .4% of the revenue is returned to Boston for school transportation costs.

Personal Income Tax. The revenues generated from retail employees at the Navy Yards are estimated by assuming 3 employees per 1,000 square feet of retail space, in line with current employment patterns at specialty shopping centers. Wages are taxed at 5 percent, with 11 percent returned to Boston.

## HOTEL

A hotel generates revenues from a variety of sources: property tax, corporation tax, personal income tax, sales tax, meals tax, alcohol tax, cigarette tax, and occupancy tax. The taxes can be estimated in the same fashion as for retail space, and will not be repeated here. The only additional revenue source is the occupancy tax, which is discussed below.

Room Occupancy Tax. The State levies a tax on the price of a hotel room or other transient accommodations. Exceptions occur is the room is rented for more than 90 days or if the rental

rate is \$2 per day or less. The rate is currently 5.7 percent of the price. Approximately 11 percent will be returned to Boston.

## OFFICE

Office space generates a variety of tax revenues, depending on the user of the space. These revenue sources include the property tax, the corporation excise tax, personal income tax, insurance tax, and bank taxes. The techniques for estimating revenues from these sources are given below.

Property Tax. The property tax on office space varies from 14 percent to 38 percent of market values, according to a survey of 21 buildings conducted by Economics Research Associates. The mean effective assessment ratio was found to be 26 percent. The mean assessed value for the buildings surveyed was \$14.41 per square foot, while the standard deviation was 6.79. The property tax itself can be estimated by taking 26% of market value times the current tax rate.

Corporation Tax. As with prior land uses, the corporation tax is estimated at 8 percent of gross income or 8.55 percent of net income.

Insurance Tax. There is a State tax on premiums, net values of policies, and underwriting profits of insurance companies. Insurance taxes apply to all business done in Massachusetts. The rate may be 2 percent or 5 percent of premiums or underwriting profits, depending on the type of company. Approximately 11 percent of the revenue is returned to Boston.

Taxes on Banks and Financial Institutions. There is also a State tax on net income and/or average worth of bank deposits. The tax is 11.4% of net income for commercial banks and trust companies and 1.14 percent of net operating income for savings and cooperative banks. Savings and cooperative banks also pay .114% of average deposits for the total year. Approximately 11 percent of the State income from bank taxes is returned to Boston in the form of State aid.

Personal Income Tax. The personal income of office employees is taxed at 5%, of which 11% is returned by the State to Boston. Employees are estimated by assuming 225 square feet per employee.



TABLE B-9

REVENUES GENERATED THROUGH HOTEL DEVELOPMENT  
IN THE CITY OF BOSTON

<u>Revenue Source</u>	<u>Basis of Measurement</u>	<u>Percent Allocated to Boston</u>
Property Tax	6.0-6.5% of market value	100%
Corporation Tax	8% of gross income, or 8.55% of net income	11%
Sales Tax	Room sales x 3%	15%
Meals Tax	5% of price	11%
Alcohol Tax	.57% of gross receipts, and approximately \$1.25 per gallon.	11%
Cigarette Tax	16 cents per pack	.4%
Room Occupancy Tax	5.7% of room price	11%
Personal Income Tax	5% of wages	11%

Source: Economics Research Associates.

TABLE B-10

REVENUES GENERATED THROUGH OFFICE DEVELOPMENT  
IN THE CITY OF BOSTON

<u>Revenue Source</u>	<u>Basis of Measurement</u>	<u>Percent Allocated to Boston</u>
Property Tax	26% of market value x current tax rate	100%
Corporation Tax	8% of gross income, or 8.55% of net income	11%
Insurance Tax	2-5% of gross premiums	11%
Bank Taxes	11.4% of net income for commercial banks	11%
Personal Income Tax	wages x 5%	11%

Source: Economics Research Associates.

APPENDIX B-3  
PUBLIC EXPENDITURES

This section examines the public expenditures associated with the alternative land use packages developed for the Boston Navalyard. These general losses of expenses are analyzed: public service costs, general government costs, and the costs of maintaining the existing facilities at the Shipyard site. The expense data is drawn largely from a recently completed study by the Boston Municipal Research Bureau and Abt Associates, Inc. entitled The Effect of High Density Development on Municipal Finances in the City of Boston.

Public Costs for Direct Services

Public costs associated with development of the Boston Naval Ship Yard will arise from a variety of sources, among them fire, police, and public works services. The nature of these costs will vary according to the specific land uses. These costs are estimated, by land use, in the following paragraphs.

Residential Development. One of the proposed land uses for the Charlestown site is for high income residential developments. To approximate the type of housing costs envisioned, an average of the direct service costs found in East Boston, South Boston, and Beacon Hill was taken. These direct service costs, drawn from Boston Municipal Research Bureau and Abt Associates data, are shown on a per capita basis on the following table (B-11). The numbers incorporate debt service on capital improvements where possible. The average total direct service costs per capita for the residential areas is \$467. In the benefit/cost analysis here, the rounded figure of \$465 per capita is used.

Industrial Development. For purposes of estimating direct service costs for industrial development, the South Station area service costs were assumed to approximate service costs in an industrial area. The area contains a high proportion of industrial/warehousing buildings. Total direct service costs for the South Station area are \$321 per 1,000 square feet. This analysis assumes \$320 per 1,000 square feet for industrial space. The breakdown of industrial costs, as well as costs for other land uses, is shown in Table B-12.

Retail Development. The direct service costs that are incurred in the Washington Street area are assumed to approximate retail service costs for the shipyard property, since the Washington

TABLE B-11

AVERAGE DIRECT SERVICE COSTS PER CAPITA FOR  
RESIDENTIAL DEVELOPMENT AT BOSTON NAVY YARDS

<u>Service</u>	<u>Per Capita Costs</u>
Fire	\$ 66
Police	\$ 73
Public Works	\$ 42
Traffic and Parking	\$ 2
MBTA Deficit	\$ 18
Schools	\$239
Housing Inspection	\$ 2
Public Service	\$ 2
Courts	\$ 23
Total Direct Services	\$467

Source: Boston Municipal Research Bureau and Abt Associates, Inc.,  
The Effect of High Density Development on Municipal Finances  
in the City of Boston, April, 1974.

TABLE B-12

DIRECT SERVICE COSTS FOR ALTERNATIVE LAND USES  
AT THE BOSTON NAVY YARDS

	<u>Direct Service Cost Per 1,000 Square Feet</u>				
	<u>Industrial</u>	<u>Retail</u>	<u>Office</u>	<u>Hotel</u>	<u>Institutional</u>
Fire	\$ 53	\$102	\$ 94	\$102	\$ 76
Police	\$ 92	\$221	\$ 79	\$221	\$127
Public Works	\$ 60	\$ 35	\$ 30	\$ 35	\$ 43
Traffic and Parking	\$ 9	\$ 5	\$ 4	\$ 5	\$ 7
MBTA Deficit	\$ 91	\$287	\$ 75	\$287	\$127
County Courts	\$ 16	\$ 59	\$ 17	\$ 59	\$ 42
Total	\$321	\$711	\$299	\$711	\$422

Source: Boston Municipal Research Bureau and Abt Associates, Inc.,  
The Effect of High Density Development on Municipal Finances  
in the City of Boston, April, 1974; and Economics Research  
Associates.

Street area is predominantly retail in nature. The analysis by the Boston Municipal Research Bureau found direct service costs to total \$711 per 1,000 square feet. The cost used in this analysis is \$710 per 1,000 square feet.

Office Development. The central business and financial district of Boston is dominated by office development. The costs of direct services to this area, then, is assumed to approximate direct service costs for office development at the Boston Naval Shipyard. The total direct service costs per 1,000 square feet are \$299 in the Boston central business and financial district, or approximately \$300.

Hotel Development. The nature of direct public services for a hotel development is similar to the services required by retail establishments. The two land uses are often found in conjunction with each other. For this reason, hotel service costs are estimated at \$710 per 1,000 square feet, or the same as for retail development.

Institutional Development. The exact type of development in this category varies substantially, as do the associated service costs. Services for college dormitories, classrooms, auditoriums, etc. all differ from each other and from costs for museums, hospitals, etc. It is therefore difficult to estimate service costs precisely. The Boston Municipal Research Bureau examined seven areas throughout the City to determine service costs. For this analysis, the average of the service costs in these areas is assumed to approximate institutional service costs. As shown on the table, the total average direct service costs for the seven areas in Boston is \$422 per 1,000 square feet. The rounded figure of \$420 per 1,000 square feet is used in this analysis.

#### General Government Expense Requirements

A second major expense item to be accounted for by a large new development such as the Boston Naval Shipyard is a portion of the general costs associated with the operation of the entire City government. Unlike other states, the city governments and the state are the only major taxing authorities in Massachusetts. Thus each city is assessed for the costs of other units of government: county, regular school districts, and special districts.



TABLE B-13  
GENERAL GOVERNMENT EXPENSE REQUIREMENTS  
BOSTON, MASSACHUSETTS

<u>Expense Item</u>	<u>Amount (In Thousands)</u>	<u>Percent</u>
<u>City Costs</u>		
Direct Services	\$274,397	65.2%
Community-wide Services	80,675	19.2
Central Staff	44,219	10.5
<u>County Costs</u>		
Direct Services	\$ 16,284	3.9%
Community-wide Services	1,229	0.3
Central Staff	<u>3,928</u>	<u>0.9</u>
<u>Total City and County Costs</u>	\$420,732	100.0%

Source: Boston Municipal Research Bureau and Abt Associates, Inc., The Effect of High Density Development on Municipal Finances in the City of Boston, April, 1974; and Economics Research Associates.

TABLE B-14  
ESTIMATED COSTS TO MAINTAIN EXISTING FACILITIES  
BOSTON NAVY YARDS

<u>Item</u>	<u>1972 City Budget Appropriations</u>	<u>Factor<sup>1/</sup></u>	<u>Estimated Public Costs</u>
General Government	\$ 24,209,459	.00712	\$ 172,371
Police	48,480,820	.00712	345,184
Fire	31,617,509	.00712	225,117
Traffic and Parking	1,946,548	.00712	13,859
Health and Hospitals	59,298,299	.00712	422,204
Public Works	20,507,313	.00712	146,012
Veteran's Services	9,234,676	.00712	65,751
Parks and Recreation	7,702,467	.00712	54,842
Miscellaneous	<u>8,100,952</u>	.00712	<u>57,678</u>
Total	\$211,098,043	.00712	\$1,503,018
South Boston Only:		.00480	\$1,013,271
Charlestown Only:		.00232	\$ 489,747

<sup>1/</sup> Based on estimated assessed value of \$26,000,000, which is .712% of Boston's property valuations of \$3.65 billion.

Source: City of Boston Finance Commission, Annual Report to the Legislature for 1972; and Economics Research Associates.

The City must carry the entire cost of Suffolk County expenditures. The situation arises from the provision at annexation that Chelsea, Revere, and Winthrop do not have to contribute to the costs of running the county. The total costs incurred by the City are shown on Table B-13, broken down by City and County, and also by direct service, community-wide service, and central staff costs.

As shown by the table, the direct service city costs are approximately 274 million dollars, or 65 percent of total general government expense requirements. The direct service costs identified by land use element in the previous sub-sections, then, represent only 65 percent of total city costs. This percentage factor is used in the analysis here to estimate other government costs associated with the development of the Boston Naval Shipyard.

Maintenance of Existing Facilities. There will also be public expenditures associated with the maintenance of existing facilities at the Shipyard. These maintenance costs will apply while the yards are undeveloped, and also over the portion of the yards that remain undeveloped during construction phasing.

The estimation technique used to determine public costs for maintenance of existing facilities is to assume the percent spent for public services corresponds to the project's percent of total property valuations. The combined assessed valuation of the Charlestown and South Boston properties is estimated at \$26,000,000. The valuations of the Shipyard represents .712 percent of Boston's total property valuations. Applying the percent yields on estimated total annual cost of 1.5 million dollars, as shown on the accompanying Table B-14. For Charlestown the estimated public costs are \$490,000 annually. These costs will be used in this analysis and apportioned out during the development phases of the project, until the direct service costs of the new development cover the entire site. These costs represent municipal service costs and do not reflect costs such as physical building maintenance or rehabilitation.



APPENDIX B-4  
ANNUAL REVENUE  
TABLES

The following set of tables, numbered B-15 through B-30, document the techniques used to develop the annual revenues for each land use element. These findings are summarized in Section V of this report.

TABLE B-15

DIRECT REVENUES FROM INDUSTRIAL/INSTITUTIONAL PACKAGE  
CHARLESTOWN  
INDUSTRIAL ELEMENT

Revenue Sources	Annual Revenues
Property Taxes <sup>1/</sup>	\$1,368,100
Personal Income Taxes <sup>2/</sup>	\$ 136,100
Consumer and Transaction Taxes	-
Business Excise Taxes <sup>3/</sup>	\$ 64,500
Miscellaneous Taxes	-
Total	\$1,568,700

<sup>1/</sup> Forty-seven percent of market value times tax rate; based on ERA market value estimate for older manufacturing space of \$11 per square foot and new construction cost of \$14 per square foot.

<sup>2/</sup> Assumes 500 square feet per employee at 90% occupancy, with average wage of \$10,500 taxed at 5% with 11% returned to Boston.

<sup>3/</sup> Estimated from employee income; assumes employee compensation represents 30% of revenues with 8% of revenues equalling net income, taxed at 8%, 11% of which is returned to Boston.

Source: Economics Research Associates.

TABLE B-16

DIRECT REVENUES FROM INDUSTRIAL/INSTITUTIONAL PACKAGE  
CHARLESTOWN  
OFFICE/LOFT ELEMENT

Revenue Sources	Annual Revenues
Property Taxes <sup>1/</sup>	\$ 66,500
Personal Income Taxes <sup>2/</sup>	\$ 23,800
Consumer and Transaction Taxes	-
Business Excise Taxes <sup>3/</sup>	\$ 10,100
Miscellaneous Taxes	-
Total	\$100,400

<sup>1/</sup> Twenty-six percent of rehabilitation cost of \$1,300,000 times tax rate.

<sup>2/</sup> Assumes 225 square feet per employee at 90% occupancy, with average wage of \$10,000 taxed at 5% with 11% returned to Boston.

<sup>3/</sup> Estimated from employee income; assuming employee compensation represents 30% of revenues, with 8% of revenues equalling net income, taxed at 8% with 11% returned to Boston.

Source: Economics Research Associates.



TABLE B-17

DIRECT REVENUES FROM INDUSTRIAL/INSTITUTIONAL PACKAGE  
CHARLESTOWN  
RETAIL ELEMENT

Revenue Sources	Annual Revenues
Property Taxes <sup>1/</sup>	\$23,000
Personal Income Taxes <sup>2/</sup>	\$ 3,400
Consumer and Transaction Taxes <sup>3/</sup>	\$11,500
Business Excise Taxes <sup>4/</sup>	\$ 1,700
Miscellaneous Taxes	-
Total	\$39,600

1/ Six and five-tenths percent of market value, which is based on rehabilitation cost estimates.

2/ Based on average of three employees per 1,000 square feet, and average wage of \$7,000 taxed at 5% with 11% returned to Boston.

3/ Sales tax assumes sales of \$90 per square foot with 15% of the 3% tax returned to Boston; meals tax is 5% of price, with 11% returned to Boston and assuming 30% of establishments are restaurants and sales are \$65 per square foot; alcohol and cigarette tax revenues not estimated.

4/ Assumes 8% of sales equals net income, which is taxed at 8% with 11% returned to Boston.

Source: Economics Research Associates.

TABLE B-18

DIRECT REVENUES FROM INDUSTRIAL/INSTITUTIONAL PACKAGE  
CHARLESTOWN  
HOTEL ELEMENT

Revenue Sources	Annual Revenues
Property Taxes <sup>1/</sup>	\$260,000
Personal Income Taxes <sup>2/</sup>	\$ 900
Consumer and Transaction Taxes <sup>3/</sup>	\$ 1,800
Business Excise Taxes <sup>4/</sup>	\$ 800
Miscellaneous Taxes <sup>5/</sup>	\$ 62,400
Total	\$325,900

1/ Six and five-tenths percent of market value; assumes 200 rooms at \$20,000 per room.

2/ Based on wages and salaries of 15% of total revenues, in keeping with data reported on hotel industry by Harris, Kerr, Forster and Company; taxes at 5% with 11% returned to Boston.

3/ Five thousand square feet of restaurant and related facilities space at \$65 per square foot, taxed at 5% with 11% returned to Boston.

4/ Eight percent of room sales assumed to equal net income, which is taxed at 8%, with 11% returned to Boston.

5/ Five and seven-tenths percent of room price, with average room rate assumed to be \$20 per day and hotel occupancy rate 75%.

Source: Economics Research Associates.

DIRECT REVENUES FROM HOTEL/INDUSTRIAL/HOUSING PACKAGE  
CHARLESTOWN  
HOTEL ELEMENT

Revenue Source	Annual Revenues
Property Taxes <sup>1/</sup>	\$650,000
Personal Income Taxes <sup>2/</sup>	\$ 2,300
Consumer and Transaction Taxes <sup>3/</sup>	\$ 3,600
Business Excise Taxes <sup>4/</sup>	\$ 1,900
Miscellaneous Taxes <sup>5/</sup>	<u>\$156,000</u>
Total	\$813,800

<sup>1/</sup> Six and five-tenths of market value; assuming 400 rooms at \$25,000 per room.

<sup>2/</sup> Based on wages and salaries of 15% of total revenues, in keeping with data reported on hotel industry by Harris, Kerr, Forster and Company; taxed at 5% with 11% returned to Boston.

<sup>3/</sup> Ten thousand square feet of restaurant and related facilities space at \$65 per square foot, taxed at 5% with 11% returned to Boston.

<sup>4/</sup> Eight percent of room sales assumed to equal net income, which is taxed at 8%, with 11% returned to Boston.

<sup>5/</sup> Five and seven-tenths percent of room price, with average room rate assumed to be \$25/day and hotel occupancy rate 75%.

Source: Economics Research Associates.

TABLE B-20

DIRECT REVENUES FROM HOTEL/INDUSTRIAL/HOUSING PACKAGE  
CHARLESTOWN  
RETAIL ELEMENT

Revenue Source	Annual Revenues
Property Taxes <sup>1/</sup>	\$145,200
Personal Income Taxes <sup>2/</sup>	\$ 9,200
Consumer and Transaction Taxes <sup>3/</sup>	\$ 31,300
Business Excise Taxes <sup>4/</sup>	\$ 4,700
Miscellaneous Taxes	<u>-</u>
Total	\$190,400

<sup>1/</sup> Six and five-tenths percent of market value, which is based on rehabilitation and new construction costs.

<sup>2/</sup> Based on average of three employees per 1,000 square feet, and average wage of \$7,000 taxed at 5% with 11% returned to Boston.

<sup>3/</sup> Sales tax assumes sales of \$90 per square foot with 15% of the 3% tax returned to Boston; meals tax is 5% of price, with 11% returned to Boston and assuming 30% of establishments are restaurants and sales are \$65 per square foot; alcohol and cigarette tax revenues not estimated.

<sup>4/</sup> Assumes 8% of sales equals net income, which is taxed at 8% with 11% returned to Boston.

Source: Economics Research Associates.

TABLE B-20

DIRECT REVENUES FROM HOTEL/INDUSTRIAL/HOUSING PACKAGE  
CHARLESTOWN  
RETAIL ELEMENT

Revenue Source	Annual Revenues
Property Taxes <sup>1/</sup>	\$145,200
Personal Income Taxes <sup>2/</sup>	\$ 9,200
Consumer and Transaction Taxes <sup>3/</sup>	\$ 31,300
Business Excise Taxes <sup>4/</sup>	\$ 4,700
Miscellaneous Taxes	-
Total	\$190,400

<sup>1/</sup> Six and five-tenths percent of market value, which is based on rehabilitation and new construction costs.

<sup>2/</sup> Based on average of three employees per 1,000 square feet, and average wage of \$7,000 taxed at 5% with 11% returned to Boston.

<sup>3/</sup> Sales tax assumes sales of \$90 per square foot with 15% of the 3% tax returned to Boston; meals tax is 5% of price, with 11% returned to Boston and assuming 30% of establishments are restaurants and sales are \$65 per square foot; alcohol and cigarette tax revenues not estimated.

<sup>4/</sup> Assumes 8% of sales equals net income, which is taxed at 8% with 11% returned to Boston.

Source: Economics Research Associates.

TABLE B-21

DIRECT REVENUES FROM HOTEL/INDUSTRIAL/HOUSING PACKAGE  
CHARLESTOWN  
OFFICE ELEMENT

Revenue Source	Annual Revenues
Property Taxes <sup>1/</sup>	\$15,800
Personal Income Taxes <sup>2/</sup>	\$ 5,700
Consumer and Transaction Taxes	-
Business Excise Taxes <sup>3/</sup>	\$ 2,400
Miscellaneous Taxes	-
Total	\$23,900

<sup>1/</sup> Twenty-six percent of market value of \$308,232 times tax rate of \$196.70 per \$1,000.

<sup>2/</sup> Assumes 225 square feet per employee at 90% occupancy, with average wage of \$10,000 taxed at 5% with 11% returned to Boston.

<sup>3/</sup> Estimated from employee income, assuming employee compensation represents 30% of revenues, with 8% of revenues equalling net income, taxed at 8%, 11% of which is returned to Boston.

Source: Economics Research Associates.

TABLE B-22

DIRECT REVENUES FROM HOTEL/INDUSTRIAL/HOUSING PACKAGE  
CHARLESTOWN  
INDUSTRIAL ELEMENT

<u>Revenue Source</u>	<u>Annual Revenues</u>
Property Taxes <sup>1/</sup>	\$546,900
Personal Income Taxes <sup>2/</sup>	\$ 52,200
Consumer and Transaction Taxes	-
Business Excise Taxes <sup>3/</sup>	\$ 22,300
Miscellaneous Taxes	-
<b>Total</b>	<b>\$621,400</b>

<sup>1/</sup> Forty-seven percent of market value times property tax; based on ERA market value estimate for older space of \$11 per square foot and new construction cost of \$14 per square foot.

<sup>2/</sup> Assumes 500 square feet per employee at 90% occupancy, with average wage of \$10,500 taxed at 5% with 11% returned to Boston.

<sup>3/</sup> Estimated from employee income; assuming employee compensation represents 30% of revenues, with 8% of revenues equalling net income, taxed at 8%, 11% of which is returned to Boston.

Source: Economics Research Associates.

TABLE B-23

DIRECT REVENUES FROM HOTEL/INDUSTRIAL/HOUSING PACKAGE  
CHARLESTOWN  
WAREHOUSE ELEMENT

<u>Revenue Source</u>	<u>Annual Revenues</u>
Property Taxes <sup>1/</sup>	\$428,100
Personal Income Taxes <sup>2/</sup>	\$ 5,700
Consumer and Transaction Taxes	-
Business Excise Taxes <sup>3/</sup>	\$ 2,400
Miscellaneous Taxes	-
<b>Total</b>	<b>\$436,200</b>

<sup>1/</sup> Forty percent of market value times tax rate; based on ERA market value estimate of \$10 per square foot for older warehousing space.

<sup>2/</sup> Assumes 5,000 square feet per employee at 90% occupancy, with average wage of \$10,500, taxed at 5% with 11% returned to Boston.

<sup>3/</sup> Estimated from employee income; assuming employee compensation represents 30% of revenues, with 8% of revenues equalling net income, taxed at 8%, with 11% returned to Boston.

Source: Economics Research Associates.



TABLE B-24

DIRECT REVENUES FROM HOTEL/INDUSTRIAL/HOUSING PACKAGE  
CHARLESTOWN  
RESIDENTIAL ELEMENT

<u>Revenue Source</u>	<u>Annual Revenues</u>
Property Taxes <sup>1/</sup>	\$ 975,000
Personal Income Taxes <sup>2/</sup>	\$ 33,000
Consumer and Transaction Taxes	-
Business Excise Taxes	-
Miscellaneous Taxes <sup>3/</sup>	\$ 69,500
Total	\$1,077,500

<sup>1/</sup> Six and five-tenths of market value of unit; 500 units at \$30,000 per unit.

<sup>2/</sup> Twenty percent times gross rent; average gross rent assumed to be \$0.25 per square foot per month; 11% returned to Boston.

<sup>3/</sup> Motor vehicle excise tax; assumes 1.0 cars per unit and average car two years old initially valued at \$3,500; rate is \$66 per \$1,000 assessed valuation.

Source: Economics Research Associates.

TABLE B-25

DIRECT REVENUES FROM HOTEL/INDUSTRIAL/HOUSING PACKAGE  
CHARLESTOWN  
MARINA ELEMENT

<u>Revenue Source</u>	<u>Annual Revenues</u>
Property Taxes <sup>1/</sup>	\$16,300
Personal Income Taxes	-
Consumer and Transaction Taxes	-
Business Excise Taxes	-
Miscellaneous Taxes	-
Total	\$16,300

<sup>1/</sup> Six and five-tenths of market value.

Note: Other revenue sources not estimated.

Source: Economics Research Associates

TABLE B-26

DIRECT REVENUES FROM HOUSING/CONVENTION CENTER/HOTEL PACKAGE  
CHARLESTOWN  
OFFICE ELEMENT

Revenue Source	Annual Revenue
Property Taxes <sup>1/</sup>	\$ 86,200
Personal Income Taxes <sup>2/</sup>	32,700
Consumer and Transaction Taxes	-
Business Excise Taxes <sup>3/</sup>	14,000
Miscellaneous Taxes	-
Total	\$132,900

<sup>1/</sup> 26 percent of market value of \$1,684,928 times tax rate of \$196.70 per \$1,000.

<sup>2/</sup> Assumes 225 square feet per employee at 90 percent occupancy, with average wage of \$10,000 taxes at five percent with 11 percent returned to Boston.

<sup>3/</sup> Estimated from employee income, assuming employee compensation represents 30 percent of revenues, with eight percent of revenues equaling net income taxed at eight percent, 11 percent of which is returned to Boston.

Source: Economics Research Associates.

TABLE B-27

DIRECT REVENUES FROM HOUSING/CONVENTION CENTER/HOTEL PACKAGE  
CHARLESTOWN  
HOTEL AND CONVENTION CENTER ELEMENTS

Revenue Source	Annual Revenue
Property Taxes <sup>1/</sup>	\$2,927,600
Personal Income Taxes <sup>2/</sup>	10,000
Consumer and Transaction Taxes <sup>3/</sup>	7,200
Business Excise Taxes <sup>4/</sup>	6,800
Miscellaneous Taxes <sup>5/</sup>	546,100
Total	\$3,497,700

<sup>1/</sup> 6.5 percent of market value, assuming 1,000 rooms at \$40,000 per room and 180,000 square foot convention center.

<sup>2/</sup> Based on wages and salaries of 15 percent of total revenues, in keeping with data reported on hotel industry by Harris, Kerr, Forster, and Company, and an estimated 50 convention center employees averaging \$7,500 annual salary; taxes at five percent with 11 percent returned to Boston.

<sup>3/</sup> Twenty thousand square feet of restaurant and related facilities space at \$65 per square foot, taxes at five percent with 11 percent returned to Boston.

<sup>4/</sup> For hotel, eight percent of room sales assumed to equal net income, which is taxed at eight percent with 11 percent returning to Boston.

<sup>5/</sup> 5.7 percent of room price, with average room assumed to be \$35/day and hotel occupancy rate of 75 percent.

Source: Economics Research Associates.

TABLE B-28

DIRECT REVENUES FROM HOUSING/CONVENTION CENTER/HOTEL PACKAGE  
CHARLESTOWN  
RETAIL ELEMENT

Revenue Source	Annual Revenue
Property Taxes <sup>1/</sup>	\$162,500
Personal Income Taxes <sup>2/</sup>	12,000
Consumer and Transaction Taxes <sup>3/</sup>	40,400
Business Excise Taxes <sup>4/</sup>	6,600
Miscellaneous Taxes	-
Total	\$221,500

<sup>1/</sup> 6.5 percent of market value, which is based on rehabilitation and new construction costs.

<sup>2/</sup> Based on average of three employees per 1,000 square feet and average wage of \$7,000 taxes at five percent with 11 percent returned to Boston.

<sup>3/</sup> Sales tax assumes sales of \$90 per square foot with 15 percent of the three percent tax returned to Boston; meals tax is five percent of price, with 11 percent returned to Boston and assuming 30 percent of establishments are restaurants and sales are \$65 per square foot; alcohol and cigarette tax revenues not estimated.

<sup>4/</sup> Assumes eight percent of sales equals net income, which is taxed at eight percent with 11 percent returned to Boston.

Source: Economics Research Associates.

TABLE B-29

DIRECT REVENUES FROM HOUSING/CONVENTION CENTER/HOTEL PACKAGE  
CHARLESTOWN  
RESIDENTIAL ELEMENT

Revenue Source	Annual Revenue
Property Taxes <sup>1/</sup>	\$2,837,300
Personal Income Taxes <sup>2/</sup>	102,400
Consumer and Transaction Taxes	-
Business Excise Taxes	-
Miscellaneous Taxes <sup>3/</sup>	230,500
Total	\$3,170,200

<sup>1/</sup> 6.5 percent of market value of unit; 970 dwelling units at \$45,000 per unit.

<sup>2/</sup> 20 percent times gross rent; average gross rent assumed to be \$0.40 per square foot per month; 11 percent returned to Boston.

<sup>3/</sup> Motor vehicle excise tax: assumes 1.5 cars per unit, and average car two years old initially valued at \$4,000; rate is \$66/\$1,000 assessed valuation.

Source: Economics Research Associates.

TABLE B-30

DIRECT REVENUES FROM HOUSING/CONVENTION CENTER/HOTEL PACKAGE  
CHARLESTOWN  
MARINA ELEMENT

<u>Revenue Source</u>	<u>Annual Revenue</u>
Property Taxes <sup>1/</sup>	\$13,000
Personal Income Taxes	-
Consumer and Transaction Taxes	-
Business Excise Taxes	-
Miscellaneous Taxes	-
Total	\$13,000

<sup>1/</sup> 6.5 percent of market value.

Note: Other revenue sources not estimated.

Source: Economics Research Associates.

TABLE B-31

DIRECT REVENUES FROM INDUSTRIAL PARK PACKAGE  
SOUTH BOSTON NAVY YARDS SITE

<u>Revenue Sources</u>	<u>Annual Revenues</u>
Property Taxes <sup>1/</sup>	\$1,275,600
Personal Income Taxes <sup>2/</sup>	\$ 120,600
Consumer and Transaction Taxes	-
Business Excise Taxes <sup>3/</sup>	\$ 51,500
Miscellaneous Taxes	-
Total	\$1,447,700

<sup>1/</sup> 57% of market value times tax rate; based on ERA, market value estimate for older manufacturing space of \$11 per square foot and new construction cost as computed by Wallace, Floyd, Ellenzweig, Inc.

<sup>2/</sup> Assumes 500 square feet per employee at 90% occupancy, with average wage of \$10,500 taxed at 5% with 11% returned to Boston.

<sup>3/</sup> Estimated from employee income; assumes employee compensation represents 30% of revenues, with 8% of revenues equalling net income, taxed at 8%, 11% of which is returned to Boston.

Source: Economics Research Associates



TABLE B-32

DIRECT REVENUES FROM MIXED INDUSTRIAL PACKAGE  
SOUTH BOSTON NAVY YARDS SITE

<u>Revenue Sources</u>	<u>Annual Revenues</u>
Property Taxes <sup>1/</sup>	\$1,061,300
Personal Income Taxes <sup>2/</sup>	102,000
Consumer and Transaction Taxes	-
Business Excise Taxes <sup>3/</sup>	43,500
Miscellaneous Taxes	<u>-</u>
Total	\$1,206,800

<sup>1/</sup> 47% of market value times tax rate; based on ERA market value estimate for older manufacturing space of \$11 per square foot and new construction costs, as estimated by Wallace, Floyd, Ellenzweig, Inc.  
<sup>2/</sup> Assumes 500 square feet per employee at 90 percent occupancy, with average wage of \$10,500 taxes at 5%, with 11% returned to Boston.  
<sup>3/</sup> Estimated from employee income; assumes employee compensation represents 30% of revenues, with 8% of revenues equaling net income, taxes at 8% with 11% returned to Boston.

Source: Economics Research Associates.

APPENDIX B-5  
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